DOCUMENT RESUME

ED 248 911 JC 840 492

TITLE An Evaluative Study of the Student Completion Rate for Mathematics 1403 (A, B, C).
INSTITUTION Tarrant County Junior Coll., Fort Worth, TX. South Campus.
PUB DATE May 84
NOTE 209p.; Portions of appended tests may be marginally legible.
PUB TYPE Reports - Research/Technical (143) -- Statistical Data (110)

EDRS PRICE MF01/PC09 Plus Postage.
DESCRIPTORS *Academic Persistence; *Course Content; Curriculum Development; Dropout Rate; Dropout Research; Enrollment Trends; *Remedial Mathematics; *Student Characteristics; Teaching Methods; Two Year Colleges; *Two Year College Students; *Withdrawal (Education)

ABSTRACT

An analysis is presented of factors and conditions affecting student completion rates in the remedial mathematics program (Mathematics 1403) in the Tarrant County (Texas) Junior College District. Following introductory material on the purposes of the study and the tasks of five project teams, chapter I examines the purpose and historical background of Mathematics 1403, which includes courses in arithmetic, beginning algebra, and intermediate algebra. Chapter II provides an overview of generally accepted curricula and instructional standards for postsecondary remedial math programs, highlighting the lack of national standards, current concern about the need for such programs, and low retention rates in Texas and outside the state. Chapter III considers curricular and instructional influences on student completion rates in Mathematics 1403, revealing a common core of essential course content with variation in peripheral topics among the three district campuses. Chapter IV presents and analyzes 1980-81 and 1981-82 data on Mathematics 1403, focusing on student placement scores, mode of instruction, day-evening schedule, class size, full-/part-time status of the instructor, individual instructors, grades, and content being studied at the time of course withdrawal. Chapter V provides the results of a study of 12 student characteristics conducted to identify characteristics influencing performance and persistence in Math 1403. The report concludes with a series of recommendations for course improvement. Detailed study findings are appended. (LAL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
A. J. Worden

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization orginating it.

☒ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

ED248911

AN EVALUATIVE STUDY OF THE STUDENT COMPLETION RATE FOR MATHEMATICS 1403 (A, B, C)

Prepared for:
Tarrant County Junior College
1500 Houston Street
Fort Worth, Texas 76102

May, 1984

JC 840 492

MEMORANDUM

May 24, 1984

TO: Council for the Improvement of Learning at TCJC

FROM: A. J. Worden, Chairman
Mathematics 1403 Study Committee

SUBJECT: Mathematics 1403: An Evaluative Study

As you requested in your charge given to us on September 16, 1982, the Mathematics 1403 Study Committee has carried out an extensive evaluative study of the student completion rates in the developmental mathematics program at Tarrant County Junior College, which is herewith submitted.

In the course of the study, the significance of developmental mathematics in the overall philosophy of instruction of Tarrant County Junior College has become clearer, along with possibilities for continuous improvement of the program through carefully conceived and executed instructional systems.

The members of the committee have agreed upon a number of recommendations, which they submit with some confidence that their implementation will result in improved student completion rates in Mathematics 1403 throughout the Tarrant County Junior College District.

PREFACE AND ACKNOWLEDGMENTS

The Mathematics 1403 Study Committee is pleased to submit the following Evaluative Study of the Student Completion Rate for Mathematics 1403 (A, B, C). This study addresses a nationwide concern with low student completion rates in remedial mathematics programs.

To the junior colleges and professional organizations who contributed to the study, the committee is most grateful. Appreciation is also expressed to Dr. Ray Carry, University of Texas at Austin, Consultant for Mathematics Education, Esther C. Huckaby, Tarrant County Junior College - Northwest Campus, Editor, and to Carol Helton, John Mills, Belinda Morgan, Mary Rode, and Carolyn Sewell for their creativity and dedication in carrying out this project.

ABSTRACT

This evaluative study of the student completion rate for remedial mathematics at Tarrant County Junior College responds to concern over low retention rates in such courses not only at this school but across the state and nation. The study assesses the condition at all three campuses of Tarrant County Junior College and at all three levels of the course (Mathematics 1403, A, B, C), places it into a statewide and nationwide perspective, and identifies a number of factors likely to affect the student completion rate. These include elements of course design, instructional design, physical environment, and student population. The findings from this study have produced a number of recommendations intended to improve the student completion rate in Mathematics 1403 at all levels and at all campuses of Tarrant County Junior College.

AN EVALUATIVE STUDY OF THE STUDENT COMPLETION RATE FOR MATHEMATICS 1403 (A, B, C)

INTRODUCTION

Of the approximately 4000 students who enroll each semester in Mathematics 1403, the remedial mathematics program of Tarrant County Junior College, fifty percent complete the course in their first attempt. But what of the fifty percent who do not? A review of professional literature indicates that low Student Completion Rates (SCR) in remedial mathematics are a matter of universal academic concern. Because the problem is so widespread, it might be reasonable to assume that such low SCR's are inevitable, but are they? Tarrant County Junior College has chosen to take a closer and more careful look at these two questions: (1) What factors affect SCR's? (2) Are low SCR's inevitable? It has therefore authorized this extensive Evaluative Study of the Student Completion Rate for Mathematics 1403 (A, B, C).

The purposes of this study are to assess the Student Completion Rate in Mathematics 1403 (A, B, C) throughout the Tarrant County Junior College District, to identify factors that may affect SCR, and to consider how the SCR might be improved.

To accomplish these purposes, a committee was convened and divided into five project teams, each of which was charged with a specific investigative task:

* Project Team I, which included Project Director Linda Kyle (Northeast Campus), Ezekiel Tolbert (Northwest Campus), Ed Windebank (South Campus), and Tom Stover (Northeast Campus, Ex-officio), was charged to make an historical review of Mathematics 1403 in the Tarrant County Junior College District.
* Project Team II, which included Project Director Tom Howle (Northeast Campus), Dane Phillips (Northwest Campus), David Price (South Campus), and Raymond Van Cleef (Northwest Campus, Ex-officio), undertook a study of the course curriculum and instructional standards for remedial mathematics programs.
* Project Team III, which included Project Director Catherine Standefer (South Campus), Waunnetta Walling (Northeast Campus), Wanda Wright (Northwest Campus), and Jim Worden (South Campus, Ex-officio), investigated curriculum and instructional standards by mode of instruction.
* Project Team IV, which included Project Director Linda Hines (Northwest Campus), John Garlow (Northwest Campus), Guy Golden (South Campus), Horace Griffitts (District), Bob Langston (Northeast Campus), and Vicki Mason (District), gathered and analyzed data from the fall and spring semesters of the 1980-81 and 1981-82 school years.
* Project Team V, which included Project Director Ara Sullenberger (South Campus), Kathryn McClellan (Northeast Campus), Gloria Mills (Northwest Campus), and Linda Hines

(Northwest Campus, Ex-officio), compiled and analyzed the characteristics of students who enroll in Mathematics 1403.

The collected data from the five project teams did indeed fulfill the first two purposes of the study, assessing SCR and identifying factors affecting SCR. After reviewing this data, the committee as a whole arrived by consensus at several recommendations, which are directed toward the ultimate purpose of the entire study: finding means by which SCR for Mathematics 1403 (A,B,C) throughout the Tarrant County Junior College District may be improved.

LIST OF CONTENTS

	Page
PREFACE AND ACKNOWLEDGMENTS	i
ABSTRACT	ii
INTRODUCTION	iii
LIST OF CONTENTS	vi
LIST OF FIGURES	vii
LIST OF APPENDIXES	ix
REPORT	
Chapter I - Purpose and Historical Background of Mathematics 1403	1
Chapter II - Curriculum and Instructional Standards for Remedial Mathematics Programs	6
Chapter III - Aspects of Curriculum and Instructional Standards (All Modes of Instruction)	14
Chapter IV - Presentation and Analysis of Data	24
Chapter V - Characteristics of Students Enrolling in Mathematics 1403	66
CONCLUSIONS	85
RECOMMENDATIONS	97
AFTERWORD	100
APPENDIXES	

LIST OF FIGURES

Figure Number	Figure Title	Page
2-1	Student Completion Rates for Nine Texas Institutions...	11
3-1	Course Level Enrollment.....	17
4-1	Enrollments, Mathematics 1403, All Courses.....	26
4-2	Student Enrollments, Mathematics 1403, All Courses.....	26
4-3	Completion Rates, Mathematics 1403, All Courses.....	27
4-4	Distribution of Enrollments by Level/Mathematics 1403..	28
4-5	SCR's by Level for each Campus.....	29
4-6	Enrollment and Completion (Northeast Campus).....	30
4-7	Enrollment and Completion (Northwest Campus).....	31
4-8	Enrollment and Completion (South Campus).....	32
4-9	Enrollment and Completion (Total, All Campuses).....	33
4-10	Actual and "Normal" Enrollment/Mathematics 1403.....	34
4-11	Actual and "Normal" Completion/Mathematics 1403.....	35
4-12	Grade Distributions, 1980-81 and 1981-82.....	37
4-13	SCR for Re-Enrollees.....	39
4-14	Percentage of Completion/Second Mathematics Course.....	40
4-15	Mathematics 1403 Enrollment, Northeast, Fall 1980.....	41
4-16	Mathematics 1403 Enrollment, Northwest, Fall 1980.....	42
4-17	Mathematics 1403 Enrollment, South, Fall 1980.....	43
4-18	Comparison of SCR's/Level B, All Campuses.....	44
4-19	Percentage Enrollment/Level B After Completing Level A.	45
4-20	Comparison of SCR's/Level C, All Campuses.....	45
4-21	Percentage Enrollment/Level C After Completing Level B.	46
4-22	SCR's for Algebra After Mathematics 1403.....	46
4-23	SCR's/Liberal Arts Mathematics after Mathematics 1403..	47
4-24	SCR's/Statistics after Mathematics 1403.....	47
4-25	Enrollments/Sequential Mathematics Course.....	48
4-26	Total SCR's/Sequential Mathematics Course.....	48
4-27	Level A to Level B.....	49
4-28	Level B to Level C.....	49
4-29	Level C to First 1600* Level Course.....	49
4-30	Total/Level A, B, and C to Sequential Course.....	50
4-31	Number of Progressive Enrollments and Completions.....	50
4-32	Number of Progressive Enrollment, True Enrollment.....	51
4-33	SCR's/Northwest Campus.....	51
4-34	SCR's/South Campus.....	52
4-35	SCR's/Northeast Campus.....	52
4-36	Correlation Coefficients for Placement Exams.....	53
4-37	SCR's/Day and Evening.....	55
4-38	Student/Teacher Ratios.....	55
4-39	Sections Taught by Part-Time Instructors.....	55
4-40	SCR's/Full- and Part-Time Instructors.....	56
4-41	Non-SCR's/80 or Higher Grade Average.....	58
4-42	Non-SCR's/Below 80 Grade Average.....	58

LIST OF FIGURES (continued)

Figure Number	Figure Title	Page
4-43	Withdrawal Peaks by Week	60
4-44	Withdrawal Peaks by Specific Content	61
4-45	Withdrawal Rates Per Unit Test/Level A	62
4-46	Level B Withdrawal Rates	63
4-47	Withdrawal Rates per Unit Test/Level B	64
4-48	Withdrawal Rates Per Unit Test/Level C	65
5-1	Characteristics of Students/Level A, South Campus	69
5-2	Characteristics of Students/Level A, Northeast Campus	70
5-3	Characteristics of Students/Level A, Northwest Campus	71
5-4	Characteristics of Students/Level B, South Campus	72
5-5	Characteristics of Students/Level B, Northeast Campus	73
5-6	Characteristics of Students/Level B, Northwest Campus	74
5-7	Characteristics of Students/Level C, South Campus	75
5-8	Characteristics of Students/Level C, Northeast Campus	76
5-9	Characteristics of Students/Level C, Northwest Campus	77

LIST OF APPENDIXES

Appendix Number	Title
I-1	College Catalogue (1967) Course Description
I-2	College Catalogue (1970) Course Description
II-1	Mathematics Association of America Committee Report
II-2	Out-of-State Junior Colleges (Losak Letter)
II-3	State Board of Education Essential Elements, Descriptors
III-1	Mathematics 1403 Texts for all TCJC Campuses (1982-83)
III-2	Topics Included in Mathematics 1403A on All Campuses
III-3	Topics Included in Mathematics 1403B on All Campuses
III-4	Topics Included in Mathematics 1403C on All Campuses
III-5	Placement in Mathematics 1403
III-6	Mathematics 1403 Placement Test - South Campus
III-7	Mathematics 1403 Placement Test - Northwest Campus
III-8	Mathematics 1403 Placement Test - Northeast Campus
IV-1	Enrollments and Completions, Mathematics 1403, all courses
IV-2	Completion Rates by Campus
IV-3	Number and Percentage of Enrollments in Each Level
IV-4	Distribution of Means of Passing Grades (A-D), Level A
IV-5	Distribution of Means of Passing Grades (A-D), Level B
IV-6	Distribution of Means of Passing Grades (A-D), Level C
IV-7	Completion in Sequential Courses, Northeast Campus
IV-8	Completion in Sequential Courses, Northwest Campus
IV-9	Completion in Sequential Courses, South Campus
IV-10	Enrollments, Reenrollments, and Completions in Program
IV-11	Completion Rates for Lecture and Programmed Modes
IV-12	Completion Rates by Individual Instructor, Northeast
IV-13	Completion Rates by Individual Instructor, Northwest
IV-14	Completion Rates by Individual Instructor, South
IV-15	Students Withdrawing With Average of 80 or Higher
IV-16	Students Withdrawing With Average Less than 60
IV-17	Students Withdrawing After Initial Grade Less than 70
IV-18	Weekly Withdrawals, Fall 1982, Northeast Campus
IV-19	Weekly Withdrawals, Fall 1982, Northwest Campus
IV-20	Weekly Withdrawals, Fall 1982, South Campus
IV-21	Withdrawal Rates and Content (Prog/Level A), Northeast
IV-22	Withdrawal Rates and Content (Prog/Level A), Northwest
IV-23	Withdrawal Rates and Content (Prog/Level A), South
IV-24	Withdrawal Rates and Content (Lect/Level A), South
IV-25	Withdrawal Rates and Content (Prog/Level B), Northeast
IV-26	Withdrawal Rates and Content (Lect/Level B), Northeast
IV-27	Withdrawal Rates and Content (Prog/Level B), Northwest
IV-28	Withdrawal Rates and Content (Prog/Level B), South
IV-29	Withdrawal Rates and Content (Prog/Level C), Northeast
IV-30	Withdrawal Rates and Content (Lect/Level C), Northeast
IV-31	Withdrawal Rates and Content (Prog/Level C), Northwest
IV-32	Withdrawal Rates and Content (Prog/Level C), South
V-1	Explanation of Terms and Abbreviations Used
V-2	Pre-Survey, Mathematics 1403, Spring 1983
V-3	Post-Survey, Mathematics 1403, Spring 1983
V-4	Correlation: Anxiety to Confidence
V-5	Means and Standard Deviations: Anxiety/Confidence Scores
V-6	Pearson's Correlation Coefficients: Grade, ANX/CON Scores
V-7	Means and Standard Deviations: ANX/CON Scores, All Students

CHAPTER I

PURPOSE AND HISTORICAL BACKGROUND OF MATHEMATICS 1403

SUMMARY

A four-member committee, Project Team I, defined the district-wide purpose of Mathematics 1403 and reviewed the historical background, considering all available data, in order to track changes in course content, numbers, and format and to determine possible reasons for such changes.

The remedial program has apparently changed as the needs of students have changed. In the early 1970's, declining SAT scores and declining basic skills among high school graduates were national phenomena; many students were denied entrance into universities or were advised to take remedial courses. Older students returning to school needed to review mathematics. To accommodate the great variety of students, the methods of instruction changed. TCJC's developmental mathematics courses have been designed and modified as needed to take students where they are and bring them up to "college level."

INTRODUCTION

The team considered all TCJC catalogues, Curriculum and Instruction Reports, and Mathematics 1403 syllabi. They also interviewed faculty who had been teaching at TCJC as the changes in the mathematics course had occurred. Although the major changes in the

courses occurred in 1970, no Curriculum and Instruction records from before 1971 now exist, and exact reasons for changes in the developmental program were not recorded at that time. Therefore, Bob Langston and Ara Sullenberger were interviewed to provide this part of the historical background.

FINDINGS

Purposes of Mathematics 1403

The purposes of Mathematics 1403 on the three campuses are the same:

* To get students ready for college level courses in mathematics or
* To satisfy requirements for a two-year degree

Content of Present Course

The present (1983) courses are designed to parallel courses in Texas high schools: arithmetic corresponds to eighth grade or related mathematics in high school, elementary algebra corresponds to first year high school algebra, and intermediate algebra corresponds to second year high school algebra.

History of Mathematics 1403

At the time of TCJC's opening in 1967, four remedial mathematics courses were described in the catalogue. Complete catalogue descriptions are included in Appendix I-1.

1202. Developmental Mathematics I. Fundamental arithmetical processes.

1213. Developmental Mathematics II. Transition from elementary algebra to college algebra.

1223. Geometry. Fundamentals of plane geometry; introduction to coordinate and space geometry.

1303. Applied Algebra. Review of algebra; study of functions, graphs, etc.

By the next year, only three remedial mathematics courses remained. The geometry course had been dropped, beginning algebra was Mathematics 1213, and intermediate algebra was Mathematics 1223. Appendix I-2 shows exact catalogue descriptions. In the 1970 catalogue, all three courses are listed under a single number, Mathematics 1233. This catalogue described a course that had become more flexible:

> . . . placement within the course will be made after classes begin and will remain flexible throughout the semester. In addition to the final grade, the transcript will denote the portion of the course for which credit is given with one of the following entries: "a" - arithmetic," "b - elementary algebra," or "c - intermediate algebra."

In 1972, the course number was changed from 1233 to 1403, allowing Mathematics 1403 to satisfy the mathematics requirement for a TCJC associate degree. In 1978, the catalogue description changed:

> Comprehensive study of basic arithmetic, and beginning and intermediate algebra. Placement made after classes begin and remains flexible throughout the semester. Transcript denotes portion for which credit is given: "a - arithmetic," "b - elementary algebra," or "c - intermediate algebra."

The last catalogue change occurred in 1982 with the addition of this sentence: "May be taken four times for credit."

Reasons for Changes

To determine the reasons for this evolution of course content and format, faculty members Bob Langston and Ara Sullenberger were interviewed. They recalled that the most significant change in Mathematics 1403 occurred when the three courses were listed under one course number in the catalogue, which gave flexibility to the course. Whereas previously students had been locked into a course at registration, the 1970 change to a single-number multi-level course permitted improperly placed students to change to another course after the beginning of the semester. Students needing only review could complete more than one course in a single semester. This ability to change courses within a semester permitted a self-paced format, which became teacher-paced after it became evident that most students would not pace themselves to complete the course in one semester. Students were allowed to retest to encourage or enforce mastery of one skill before going on to the next.

During the period of transition, all changes in format, content, and catalogue descriptions were discussed at length between the two campuses then existing, South Campus and Northeast Campus.

The remedial program has apparently changed as the needs of students have changed. In the early 1970's, declining SAT scores and declining basic skills among high school graduates were national phenomena. Many students were denied entrance into universities or were advised to take remedial courses. Older students returning to school needed to review mathematics. To accommodate the great variety of students, the methods of instruction changed. TCJC's developmental mathematics courses have been designed and modified as

needed to take students where they are and bring them up to "college level."

CHAPTER II

CURRICULUM AND INSTRUCTIONAL STANDARDS FOR REMEDIAL MATHEMATICS PROGRAMS

SUMMARY

Project Team II, in its investigation of generally accepted curricula and instructional standards for post-secondary remedial mathematics programs, discovered that no national standards for remediation exist as yet. However, current literature does show considerable concern over the need for remedial programs and the problems of implementing such programs. Information from junior colleges in Texas and outside the state shows low retention rates for remedial courses. TCJC's Mathematics 1403 course is intended to cover the same general content as high school mathematics; therefore, Texas public school curriculum standards, including revisions now in progress, also affect the junior college remedial program.

INTRODUCTION

Project Team II research procedure identified and completed five tasks:

* Consulting with professional mathematics organizations
* Searching relevant literature
* Examining remedial programs at selected (intrastate) junior colleges

* Reviewing remedial programs at selected Texas junior colleges
* Studying syllabi prepared by the Texas Education Agency for high school courses equivalent to Mathematics 1403

Professional Mathematics Organizations

After consulting professional mathematics associations, Team II concluded that throughout the country, concern for curricular and instructional standards for college remediation in mathematics is a priority. In response to the inadequate mathematical backgrounds of entering students, many colleges develop remedial programs. No national standards for remediation are yet established, and in order to establish them a comprehensive study must be undertaken by a professional mathematics association. The two groups best suited for such a study are the Mathematical Association of America (MAA) and the American Mathematical Association of Two-Year Colleges (AMATYC). Although such organizations are presently investigating remediation, the completion of their efforts is several years away. In the interim, the MAA identifies some provisional criteria as reported by Professor Joan P. Leitzel (Ohio State University) in her "Committee on Improving Remediation Efforts in the Colleges." (Dr. Leitzel's full report is included in Appendix II-1). In one section of the report, "Characteristics of Effective Remedial Programs," a specific group of guidelines identifies the MAA's provisional criteria. Some of these, such as the recommendations of a "program of study tightly structured," and a "ratio of students to teachers not greater than 30:1" deal specifically with curricular and instructional standards.

The work of Dr. Leitzel's ad hoc committee on remediation has led to the establishment of a permanent MAA committee on remediation, chaired by Dr. Ron Davis (Northern Virginia Community College) who plans a national study of remedial standards. Dr. Davis mentions that current investigation of programs in California is three years away from completion. To gather information from AMATYC, Project Team II contacted Dr. Eleanor Young (Sinclair Community College in Dayton, Ohio), who teaches developmental studies and chairs AMATYC's Developmental Mathematics Committee. Her group is in the preliminary stages of constructing a model for the evaluation of remedial programs. Dr. Young referred Team II to Professor Geoffery Akst (Manhattan Community College, City University of New York), who has served as a consultant on remediation in mathematics to various colleges. He confirms that the establishment of national remedial standards in mathematics depends upon a future study by a professional mathematics association.

Relevant Literature

A nationwide computerized search of the relevant literature was conducted to gather information about remedial mathematics programs. A list of 996 titles, including 352 dissertations, 359 journal articles, and 285 ERIC reports was obtained. The project team then identified 34 dissertation abstracts, 82 journal articles, and 20 ERIC reports to be reviewed.

The search of the literature corroborated Leitzel's position that there was no one curricular or instructional model of remediation. The literature indicates that remedial programs represent

individual efforts and have been in response to local problems. However, junior colleges throughout the country are in general agreement concerning the content of remedial mathematics courses, and they are covering standard topics. Tarrant County Junior College's program is typical in its focus on arithmetic and algebra, with the latter usually subdivided into elementary and intermediate algebra. Some schools cover this material in two semesters; others, including most Texas public junior colleges, offer three courses similar to Mathematics 1403 A, B, and C. Although a few junior colleges also offer a separate course in geometry, geometric topics are generally incorporated into arithmetic and algebra courses.

The two most frequently used instructional modes or formats in remedial mathematics courses are lecture and programmed. In either mode, a mathematics laboratory is often available to provide students with additional individual assistance. Although many comparative studies of the two modes have been conducted, there is no general agreement as to the superiority of either. It has been found that programmed classes need considerable structure; for example, test and chapter due-dates help students move steadily toward course completion.

A survey of several nationally prominent junior colleges outside Texas is included in Appendix II-2, and a group of particularly helpful readings is listed in the bibliography at the end of this chapter.

Junior Colleges in Texas

Grade distributions and SCR'S for courses similar to Mathematics 1403

were requested from several large Texas public junior colleges. (The SCR's are summarized in Figure 2-1 on the next page.)

These figures show that TCJC's completion rate in Mathematics 1403 is just above average for corresponding courses in other Texas public junior colleges. However, since no consideration is given to either the curriculum or to student demographics, this data does not indicate the quality of the remedial mathematics programs at the colleges represented.

Texas Public High School Curriculum

Since Mathematics 1403 is intended, at least in part, to remediate the mathematical deficiencies of students arriving from public high schools, it is therefore appropriate to consider the curriculum of Texas public high schools.

The Texas Education Agency was contacted concerning the curriculum requirements of the high school courses corresponding to Mathematics 1403A (Pre-Algebra), Mathematics 1403B (Algebra I), and Mathematics 1403C (Algebra II). Pre-Algebra is new to the high school curriculum; Introductory Algebra I and II are being deleted.

The Texas public school system is changing to a new set of state curriculum guidelines. House Bill 246 of the Sixty-Seventh Texas Legislature directed revision of the approach to public school curriculum and repealed all previous laws requiring courses or subjects to be taught. Beginning with the fall semester, 1984, the State Board of Education is charged with designating the "essential elements" for each subject and with requiring each school district

to provide instruction in those elements in order to be accredited. After adoption by the State Board of Education, the statewide core curriculum that must be offered to students will be established.

In Appendix II-3, the "essential elements" and their associated "descriptors" are listed for Pre-Algebra, Algebra I, and Algebra II. One especially significant change in the core curriculum requirements for mathematics courses is that the new curriculum for Algebra II is more stringent than the Mathematics 1403 curriculum offered by TCJC. Other curriculum changes are under consideration by the State Board of Education, and specific courses of questionable status are Fundamentals of Mathematics II and Introductory Algebra I and II.

This year the coordinating Board is distributing a booklet to Texas high school juniors, Goals for College Success - A Practical Guide for College Preparation, which lists the mathematics topics required for college preparation. By distributing this booklet, the public schools appear to acknowledge that graduates of Texas high schools enter TCJC and other colleges with deficiencies in mathematics; curriculum changes appear to attempt to remedy these deficiencies. If Texas high school graduates in general could be helped to math proficiency by these measuress, then Mathematics 1403 would possibly become a review course, and SCR's would increase.

BIBLIOGRAPHY

Crepin, Dorothy M. "A Developmental Mathematics Program for Community College students." ERIC ED 210076, 1981.

Dahlke, Richard M. "Studying the Individual in an Individualized Course in Arithmetic at a Community College: A Report on Four Case Studies." Mathematics Teacher, March 1975, pp. 181-188.

Fennema, Elizabeth. Sherman, Julia A., "Fennema-Sherman Mathematics Attitudes Scales: Instruments Designed to Measure Attitudes Toward the Learning of Mathematics", pp. 8, 14.

Friedlander, Jack. "Developmental Mathematics: Junior College Resource Review." ERIC ED 172894, 1979.

Jorgensen, Patrick Richard. "A Survey of Remedial/Developmental Mathematics Programs at Two-Year Public Colleges." Dissertation Abstracts International, September 1981, pp. 973-a.

Oliver, W. P. "Computer-assisted Mathematics Instruction for Community College Students." International Journal of Man-Machine Studies. July 1973, pp. 385-395.

Smallen, Anne. "Developmental Mathematics at Mohawk Valley Community College." ERIC ED 201360, 1981.

Trillian, Alice Stewart and Associates. Teaching Basic Skills in College. San Francisco: Jossey-Bass Publishers, 1980.

CHAPTER III

ASPECTS OF CURRICULUM AND INSTRUCTIONAL STANDARDS (ALL MODES OF INSTRUCTION)

SUMMARY

Project Team III studied curriculum and instructional aspects that affect the SCR in Mathematics 1403 for each mode of instruction. For all three TCJC campuses, the team investigated syllabi, course contents, and entry and exit skills. They also reviewed instructional methods, evaluative procedures, and administrative support, which included class size, facilities, clerical and instructional services, and staffing. This study revealed that a core of essential course content is common on all campuses, but that the three campuses vary on some peripheral topics.

INTRODUCTION

Each TCJC campus supplied the syllabi for each level of Mathematics 1403, a list of topics taught at each level, departmental unit tests, final exams, placement tests, and descriptions of the operation of the remedial mathematics program and the math lab. After these items were reviewed, the research team identified similarities and differences in the programs.

Mathematics 1403 has evolved over more than a decade with gradual but cumulative changes, some of which have been reflected in the College catalogues and departmental syllabi. Project Team III

also looked for subtle changes from stated objectives and for significant differences within the TCJC District.

FINDINGS

Purposes and Course Descriptions of Mathematics 1403

The purposes of Mathematics 1403 on the three campuses are the same: (1) to prepare students for college-level courses in mathematics or (2) to satisfy requirements for a two-year degree. The program has three levels:

Mathematics 1403A: Arithmetic

Mathematics 1403B: Elementary Algebra

Mathematics 1403C: Intermediate Algebra

Students may enter the sequence at any level for which they have adequate preparation and exit at levels required for entry into other mathematics sequences:

Level A will prepare for entry into Mathematics 1323-1333 (Technical Mathematics) as well as into level B

Level B will prepare for entry into Mathematics 1613-1623 (Liberal Arts Mathematics) or Mathematics 1673 (Statistics) as well as into level C

Level C will prepare for entry into Mathematics 1633-1643-1725 (Science/Engineering Mathematics) or Mathematics 1603-1663 (Business/Behavioral Sciences Mathematics)

Examination of course syllabi, comparison of course outlines and lists of topics, and analysis of departmental tests for all levels indicate that the courses offered on the three campuses are as advertised.

Textbooks

Each campus chooses the texts for its courses. South Campus and Northwest Campus texts are the same for level A and for levels B and C programmed. South Campus uses a different sequence for its lecture B and C. Northeast Campus uses no texts in common with other campuses. Appendix III-1 lists the texts in current use throughout the TCJC District.

Course Content, Emphasis, and Level of Mastery

Although course content is not identical, it is in general agreement throughout the TCJC District. While a core of essential topics is common to each level on all campuses, the campuses may occasionally vary on some peripheral topics. Appendices III-2, III-3, and III-4 break down course content at A, B, and C Levels.

Course emphasis is also the same throughout the District. Students are expected to develop the needed mathematical skills as well as an understanding of principles, processes, and applications. Formal proofs and rigorous development of theory are excluded from the developmental program.

A similar level of mastery is required on all campuses, as indicated by departmental unit tests and final examinations.

Distribution by Level

District-wide, the yearly percentage of students enrolled at each level of Mathematics 1403 is consistent:

Figure 3-1

Course Level Enrollment

Level	Percentage
A	35-36
B	43-44
C	20

However, each campus has a distinct profile of the distribution: on South Campus, a typical breakdown is 49-36-15, for levels A, B, and C, respectively; on Northwest Campus, 31-51-18; on Northeast Campus, 18-48-34. (See Appendix IV-3.)

Instructional Modes

Two instructional modes are used in teaching Mathematics 1403. In the programmed mode, students on all levels work under the supervision of the same instructor during the same class period, and individual assistance is given as needed. There is no group instruction. In the lecture mode, students on one level attend a class in which traditional methods are used, including lecture, demonstration, and group discussion.

The South Campus offers all three levels by both modes. The Northwest Campus offers only programmed instruction at all levels. The Northeast Campus uses both modes in levels B and C but only the programmed mode in level A.

In the programmed mode on the South Campus, students at all levels of Mathematics 1403 are assigned to one section, which meets with its instructor in a separate classroom. On the Northwest Campus, Mathematics 1403 students and Technical Mathematics students

are combined in one section with one instructor in a separate classroom. On the Northeast Campus, students in Mathematics 1403 and Technical Mathematics receive assistance from an instructor and a student assistant in an open tutorial lab. Students who are receiving tutoring in other subjects use the lab at the same time, coming and going freely during class time.

In the lecture mode on the South Campus, 35 students are assigned to a section; on the Northeast Campus, 37. Except for the use of a standardized grading system and departmental tests, instructors in the lecture sections of Mathematics 1403 are free to adapt their methods to the needs of individual classes.

Project Team III perceived certain advantages for both modes of instruction. In the programmed course, those students apparently unable to benefit from group instruction in mathematics may obtain help as they follow their individual courses. For others, the great advantage of the programmed mode lies in its flexibility; students who are reviewing previously learned material or who are above average in ability and dedication can move rapidly through the levels, while the slow but capable students benefit from taking an extra semester to complete the work, picking up each semester at the point they left the previous semester. Moreover, the programmed mode makes it possible to demand mastery of every portion of the course. The student who fails a test or who is below average in ability is not pushed into new material without having an opportunity to re-study the previous portion. The programmed mode is also easier to schedule and balance.

On the other hand, traditional classroom lecture methods are well-suited to those students who benefit more from longer periods

in group instruction than from brief individual instruction. Under traditional methods, students are usually able to maintain an average pace, and they benefit from group support. Moreover, these students may more easily adjust to the traditional instructional methods used in advanced mathematics courses.

Students beginning the Mathematics 1403 program in one mode are free to choose the alternative mode in subsequent semesters. However, students who have completed part of a level in the programmed mode need to return to that mode to take advantage of the progress they have made. If students in the lecture sections on Northeast Campus fail unit tests during the semester, they are routinely transferred from traditional lecture to programmed instruction.

Evaluation Procedures

For fall, 1980-81, enrollment and completion rates in the two modes are compared in Appendix IV-11. Evaluation procedures on the three campuses, although not identical, are similar. At all levels the course grade is determined from grades on unit tests and a final exam, with the final exam counting 20% to 31% of the grade. On the South Campus, in order to receive a passing grade in the course, the student must make a passing grade on the final exam; if this condition is met, the score on the final is combined with scores on unit tests to obtain the course grade.

Departmental tests are used on all campuses. On the Northeast Campus, the same series of unit tests is used in lecture and programmed modes; on the South Campus, two different series are used. Although minor differences in course content on the various

campuses have already been noted, tests over the same content on all campuses are markedly similar. The greatest difference in tests is that Northwest Campus and Northeast Campus tests are multiple choice; South Campus tests are not.

On all campuses, some provision is made for retaking tests. On Northwest Campus, a student may retake any unit test once, his score in such a case being the average of the two. On South Campus, unit tests may be retaken if the first score is below 70, the highest possible grade on a retake being 70. The final exam may be retaken if the score is less than 60. Northeast Campus allows two retakes on unit tests if the original score is less than 70; the highest possible grade on the first retake is 70; on the second, 60. A student who fails the second retake is withdrawn from the course.

On the Northeast Campus, programmed sections take tests in a center near the tutorial room; lecture sections take tests at a campus testing center, with retakes in a lab. On the Northwest Campus, the math lab contains a testing room. On the South Campus, programmed sections are tested in the math lab; lecture sections, except for retakes, are tested in the classroom.

In all cases, tests are kept in the testing room. When a student tests individually, the test is scored immediately. The results are given to student and instructor, but the testing materials are not removed from the room.

On all three campuses, placement into one of the three levels of Mathematics 1403 is determined by scores on placement tests. (See Appendix III-5.) South Campus and Northwest Campus use departmentally developed tests; Northeast Campus uses "Descriptive Tests of Mathematics Skills of the College Board." Copies of these tests and

placement criteria are included in Appendices III-6, III-7, and III-8. A District committee appointed in the fall 1981 semester to investigate mathematics placement procedures on all campuses worked during 1981-1982 and the first part of 1982-1983 on the development of tests for district-wide use. However, until this Mathematics 1403 SCR study is completed, the committee's work has been tabled.

Outside Class Assistance

On all campuses extra assistance outside class is available to students. They may meet with their instructors during their scheduled ten office hours each week. In addition, on South Campus and Northwest Campus math labs offer assistance. Northeast Campus does not have a separate math lab, but tutoring is available in a tutorial lab at the "math table."

On South Campus the math lab occupies two rooms. The outer room, used primarily for tutoring, doubles as a workroom for faculty in the Academic Classroom Building and houses duplicating machines. The inner room is reserved for testing. South Campus has three half-time positions for instructional aides and sufficient student assistants so that at least two people are in the lab at all times. Since the Mathematics Department does not have a departmental secretary, the aides and assistants perform secretarial duties for the department.

On the Northwest Campus the math lab has a testing room and a tutoring room. The department has one full-time instructional associate and two half-time instructional aides, but has no student assistants in the lab. The instructional aides' time is used almost exclusively for testing. Although various learning materials are

available in the tutoring room, present staffing does not permit much individual attention. Full-time mathematics faculty fill in to keep the lab open for testing when the aide is off for lunch. Secretarial assistance is available from the division.

On the Northeast Campus, there is no separate math lab. Programmed mathematics classes are held in an open area where tutoring for all subjects is available. In addition to student assistants, there are two half-time instructional aides whose duties are also clerical and tutorial. One secretary serves both the Mathematics and Computer Science Departments.

Classroom Arrangement

The arrangement of classrooms for Mathematics 1403 differs on the three campuses. On South Campus five classrooms in the immediate vicinity of the math lab are used almost exclusively for mathematics classes. Although other mathematics classes are scheduled outside this area, Mathematics 1403 classes are always in these five rooms. With this arrangement, students can report to the math lab for testing and then return immediately to their classrooms, and instructors can obtain test results without leaving their classes for more than two or three minutes. While more classrooms are needed overall for mathematics, the Mathematics 1403 situation is satisfactory.

On the Northwest Campus, classrooms for mathematics are scattered but satisfactory. All classrooms are in a different wing from the lab.

On the Northeast Campus, no classrooms are available for programmed classes. The open area in which the classes meet makes

group communication difficult. The "math table" is located in a high traffic area where students are free to enter and leave throughout the class period. Other mathematics classes, including Mathematics 1403 lecture sessions, are scattered. Some classrooms are inadequate because of heat, humidity, and stored equipment and materials.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

SUMMARY

Project Team IV gathered and analyzed data related to the Mathematics 1403 program in order to help identify factors which have an effect on the completion rate. The team discovered that distribution of enrollment by level (A, B, and C) varied from campus to campus and that the completion rates varied among the three levels and the three campuses. They studied completion rates during the second and third attempt at the course as well as in sequential mathematics courses. Placement scores, mode of instruction, day and evening classes, class size, full and part-time instructors, individual instructors, grade made, and content being studied at the time of withdrawal were factors considered.

INTRODUCTION

This chapter contains a presentation and analysis of data on the Mathematics 1403 program of the three campuses. For each topic studied, a brief analysis is presented, most of which is based on data from the four long semesters of 1980-81 and 1981-82.

Enrollment figures and final grade analyses for Mathematics 1403 have been available for the past several years by computer reports on a semester basis and have provided the only statistical

profile of the Mathematics 1403 program. In such computer reports, Mathematics 1403 is treated as one course rather than as three separate courses. It has not been possible to determine from past reports the enrollment or SCR's for each level. The term "completion" refers to passing grades, A, B, C, and D. The term "non-completion" refers to grades W, WF, and F.

The data from this study provide a more comprehensive profile of enrollments, progress, and completion for each level, mode of instruction, and campus. Sources for the data were departmental and campus placement records, math lab grade sheets, final grade sheets, enrollment status reports, final grade analysis reports, enrollment report from the Office of Research, and two special computer programs prepared by Mary Rode of Computer Services.

Each mathematics department chairperson or coordinator collected data from his/her campus, which were compiled by the Team IV director for this report.

Regarding enrollment data, the committee recognized that while several factors might affect enrollment, they were not readily measurable. These factors included the different overall program offerings and emphases on each campus and their respective mathematics requirements, initial and follow-up counseling, and placement policies.

FINDINGS

Enrollment Data

The data in Figure 4-1 show the relationship of Mathematics 1403 enrollments to total course enrollments for the four semesters cited. Northeast Campus enrolls a smaller percentage of students in

Mathematics 1403 than Northwest or South Campus. The distributions of enrollment in Mathematics 1403 are very similar on Northwest and South Campuses.

Figure 4-1

Mathematics 1403 Enrollments Compared To Total Course Enrollments

	NORTHEAST			NORTHWEST			SOUTH			ALL CAMPUSES		
	All	1403	%	All	1403	%	All	1403	%	All	1403	%
1980-81												
Fall	25912	688	2.8	10080	575	5.7	24046	1452	6.3	58038	2715	4.7
Spring	22268	673	3.0	9369	435	4.7	22308	1293	5.8	54145	2421	4.5
1981-82												
Fall	26173	780	3.0	10832	626	5.8	25744	1502	5.8	62749	2908	4.6
Spring	23791	728	3.1	9555	528	5.5	23262	1407	6.0	56608	2663	4.7
TOTAL	96144	2869	3.0	40036	2184	5.5	95360	5654	5.9	231540	10707	4.6

Enrollment figures by semester are shown in Figure 4-2 for Mathematics 1403, Mathematics other than 1403, and all courses. See Appendix IV-1 for graphs of this data.

Figure 4-2

Enrollments

Mathematics 1403, Mathematics Other than 1403, All Courses

	NE			NW			S			All Campuses		
	1403	Other Math	All	1403	Other Math	All	1403	Other Math	All	1403	Other Math	All
1-81	688	791	23913	576	394	10080	1452	731	24046	2716	1836	58038
2-81	611	730	22268	435	343	9369	1293	830	22308	2339	1893	54145
1-82	808	844	26173	626	399	10832	1502	879	25744	2937	3032	62749
2-82	728	830	23791	528	331	9555	1407	880	23262	2663	2041	56608
1-83	1160	967	29793	753	356	12462	1788	1007	28433	3701	2330	70688
2-83	936	841	26888	660	459	11052	1631	1134	27329	3237	2434	65269
TOTAL		4152	153825		2993	64191		5483	151173			
		3.72%			3.36%			3.63%				

The data on enrollments show that while Northeast Campus had slightly more total course enrollments for the three-year period shown, South Campus had a greater number and percentage of enrollments in both Mathematics 1403 and mathematics other than 1403. Northwest Campus had the second highest percentage in Mathematics 1403 and mathematics other than 1403. Northeast Campus had the least percentage for both.

Completion Data

In Figure 4-3, completion rates for Mathematics 1403, mathematics other than 1403, and all courses is shown. See Appendix IV-1 and IV-2 for graphs of this data.

Figure 4-3

Completion Rates

Math 1403, Math other than 1403, All Courses

	NE			NW			S			All Campuses		
	1403 %	Other Math %	All %	1403 %	Other Math %	All %	1403 %	Other Math %	All %	1403 %	Other Math %	All %
1-81	41	63	74	60	70	74	60	62	73	55	64	73
2-81	37	67	73	57	65	73	54	66	73	50	66	73
1-82	42	61	71	58	63	73	57	62	71	53	62	71
2-82	44	62	72	55	70	73	54	59	71	52	62	72
1-83	39	55	68	58	69	72	55	59	69	50	59	69
2-83	47	63	68	55	62	70	52	60	68	51	61	69

While the three campuses have very similar SCR's for all courses, there is a difference in the SCR's in Mathematics 1403. Northeast Campus consistently had the lowest SCR in Mathematics 1403 of the three campuses (37% to 47%). Northwest Campus's SCR ranged from 55% to 60% and South Campus's SCR ranged from 52% to 60%.

Enrollments by Level

The profile of enrollment by level is very different for each campus. Percentage enrollments by level are shown in the following figure.

Figure 4-4

Distribution of Enrollments by Level of Mathematics 1403

(Fall and Spring 1980-81; 1981-82)

	Northeast		Northwest		South		Total	
	N	%	N	%	N	%	N	%
Level A	397	14	669	31	2736	48	3802	36
Level B	1363	47	1123	51	2041	36	4527	42
Level C	939	33	384	18	846	15	2169	20
Unknown	170	6	8	0	31	0	209	2
Total 1403	2869		2184		5654		10707	

On Northeast Campus 6% of the enrollment could not be identified by level. It is assumed that these are students who entered but withdrew before a level was recorded. It is further assumed that these students were somewhat evenly distributed by level. Northwest Campus had 8 students and South Campus had 31 students for whom no level was recorded during this two-year period.

Northeast Campus has its lowest enrollment in level A, much lower in proportion than level A enrollments on the other two campuses. Northeast Campus has the highest percentage enrollment in level C.

South Campus has its highest enrollment in level A; Northwest Campus in level B. South Campus and Northwest Campus have similar enrollments in level C.

For any given level on a campus, the percentage of students enrolled in that level remains consistent from semester to semester. For instance, the enrollment percentages in level B on South Campus for four semesters were 34%, 38%, 36%, and 37%.

Percentage Completion in Each Level by Campus

The SCR's for each level differ from campus to campus.

The completion rates for levels A, B, and C on the three campuses are shown in the figure below.

Figure 4-5

SCR'S by Level

SCR's	NE	NW	S
Level A	55%	57%	62%
Level B	36%	58%	49%
Level C	43%	58%	56%

For each of the three levels Northeast Campus has the lowest SCR. The greatest difference in SCR's among the three campuses occurs in level B.

The SCR for a given level on a given campus is consistent: level A on Northwest Campus for four semesters had SCR's of 56%, 58%, 57%, and 59%; level A on South Campus had SCR's of 63%, 62%, 61%, and 61%.

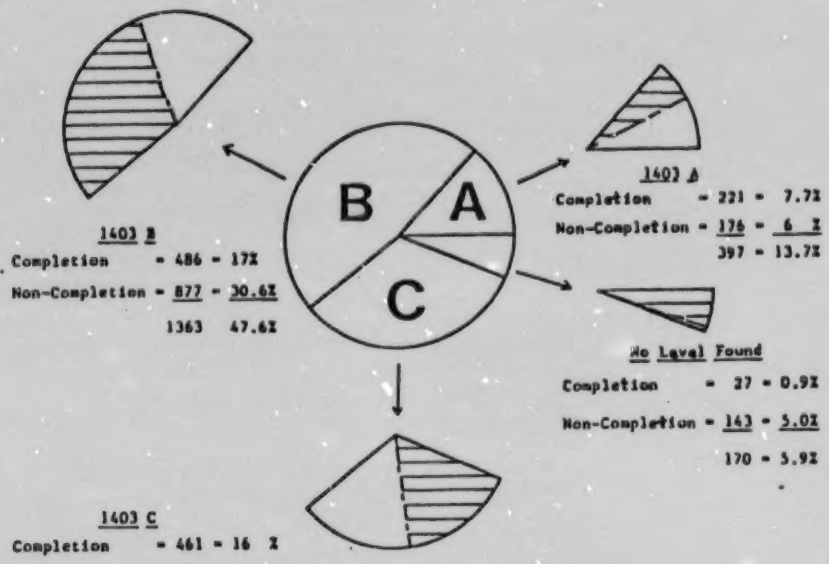
Figures 4-6 through 4-9 developed for each campus and the district show enrollment and completion for each level. See Appendix IV-3 for enrollment data.

Figure 4-6

ENROLLMENT AND COMPLETION

Northeast Campus

Mathematics 1403
Levels A, B, and C



TOTAL ENROLLMENT 1981 + 1982

Completion = 1195 = 42%

Non-Completion = 1674 = 58%

2869 = 100%

Completion = Grades A, B, C, D

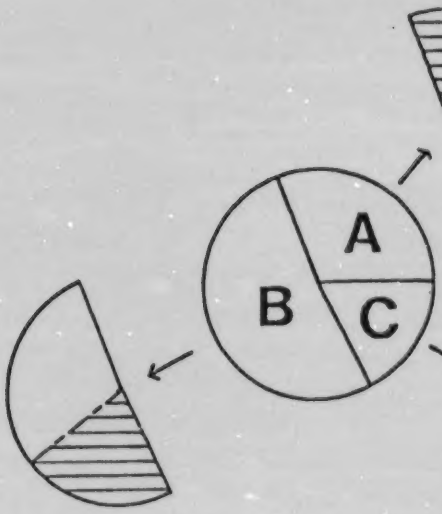
Non-Completion = Grades W, F

Figure 4-7

ENROLLMENT AND COMPLETION

Northwest Campus

Mathematics 1403
Levels A, B, and C



1403 A

Completion = 382 = 17.5%

Non-Completion = 287 = 13.1%

669 30.6%

1403 B

Completion = 647 = 29.6%

Non-Completion = 476 = 21.8%

1123 51.4%

1403 C

Completion = 235 = 10.8%

Non-Completion = 149 = 6.8%

384 = 17.6%

TOTAL ENROLLMENT 1981 + 1982

Completion = 1264 = 57.9%

Non-Completion = 920* = 42.1%

2184 = 100 %

Completion = Grades A, B, C, D

Non-Completion = Grades W, F

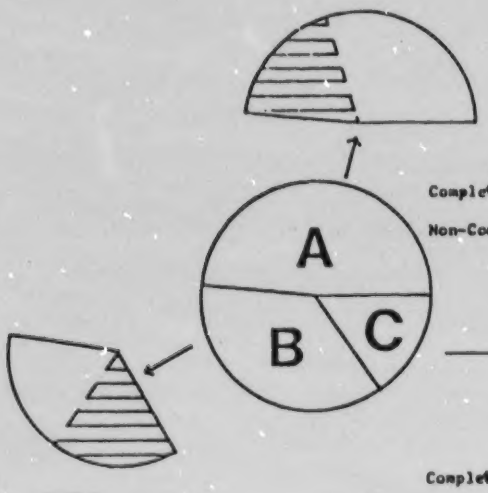
*Includes 8 with no level identified.

Figure 4-8

ENROLLMENT AND COMPLETION

South Campus

Mathematics 1403
Levels A, B, and C



1403 A

Completion = 1680 = 29.7%
Non-Completion = 1056 = 18.7%
2736 = 48.4%

1403 B

Completion = 1009 = 17.8%
Non-Completion = 1032 = 18.3%
2041 = 36.1%

1403 C

Completion = 477 = 8.4%
Non-Completion = 369 = 6.5%
846 = 14.9%

TOTAL ENROLLMENT 1981 + 1982

Completion = 3166 = 56%
Non-Completion = 2488* = 44%
5654 = 100%

Completion = Grades A, B, C, D

Non-Completion = Grades W, F

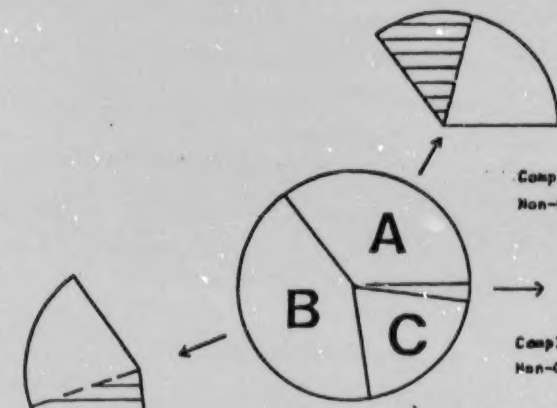
*Includes 31 with no level identified.

Figure 4-9

ENROLLMENT AND COMPLETION

Total All Campuses

Mathematics 1403
Levels A, B, and C



1403 A

Completion = 2,283 = 21.3%
Non-Completion = 1,519 = 14.2%
3,802 = 35.5%

No Level Found

Completion = 27 = 0.2%
Non-Completion = 182 = 1.7%
209 = 1.9%

1403 B

Completion = 2,142 = 20 %
Non-Completion = 2,385 = 22.3%
4,527 = 42.3%

1403 C

Completion = 1,173 = 11 %
Non-Completion = 996 = 9.3%
2,169 = 20.3%

TOTAL ENROLLMENT 1981 + 1982

Completion = 5,625 = 52.5%
Non-Completion = 5,082 = 47.5%
10,707 = 100 %

Completion = Grades A, B, C, D

Non-Completion = Grades W, F

"Normalized" Data

In an effort to equate enrollments on the different campuses to a common base, the data have been "normalized" using these assumptions (based on rounded percents for all campuses):

* 5% of all course enrollments are in Mathematics 1403.
* An enrollment distribution in Mathematics 1403 is 35, 45, and 20% for levels A, B, and C, respectively.

Figure 4-10

Actual and "Normal" Enrollment in Mathematics 1403

	NORTHEAST			NORTHWEST			SOUTH			ALL CAMPUSES		
*	Act.	Norm.	% Dif.	Act.	Norm.	% Dif.	Act.	Norm.	% Dif.	Act.	Norm.	% Dif.
Level A	397	1682	-76	669	701	- 5	2736	1669	+64	3802	4052	- 6
Level B	1363	2163	-37	1123	901	+25	3041	2146	- 5	4527	5210	-13
Level C	939	961	- 2	384	400	- 4	846	953	-12	2169	2313	- 6
Unknown	170	-		8	-		31	-		202	-	
All 1403	2869	4806	-40	2184	2002	+ 9	5654	4768	+19	10707	11577	- 8

* Act. = Actual Enrollment
Norm. = "Normal" Enrollment
% Dif. = Percent Differential using "normal" as base

These "normalized" data show that South Campus has a large enrollment in level A, while Northeast Campus has a small enrollment in level A.

Northwest Campus has the highest percentage enrollment in level B, while Northeast Campus's percentage is lowest. For level C, all campuses have a nominal under-enrollment based on the assumptions underlying the normalization.

In an effort to equate the completion rates by level on the different campuses, the data have again been "normalized," using the same assumptions as in the prior normalization effort and one additional assumption:

* 5% of all course enrollments are in Mathematics 1403.
* Enrollment distribution in Mathematics 1403 is 35, 45, and 20% for levels A, B, and C, respectively.
* Completion rate is 55% for each level.

Figure 4-11

Actual and "Normal" Completion in Mathematics 1403

	Northeast			Northwest			South			All Campuses		
	Act.	Norm.	% Diff.	Act.	Norm.	% Diff.	Act.	Norm.	% Diff.	Act.	Norm.	% Diff.
Level A	221	851	-74	382	361	+ 6	1680	857	+96	2283	2069	+10
Level B	486	1095	-56	647	484	+39	1009	1103	- 9	2142	2662	-20
Level C	461	486	- 5	235	206	+14	477	490	- 3	1173	1182	- 1
All 1403	1168	2432	-48	1264	1031	+23	3166	2450	+29	3608	5933	- 3

* Total course enrollments for four semesters of 1980-81 + 1981-82
  NE 88464
  NW 37532
  S 89141

Normalization percentages: Level A .05 x .35 x .55 = .009625
Level B .05 x .45 x .55 = .012375
Level C .05 x .20 x .55 = .0055

These "normalized" data show that, for level A, Northeast Campus has an underage (-74%) in completions, Northwest Campus has a nominal overage (+6%), and South Campus has an extreme overage (+96%).

The underage for Northeast Campus is due to the low percentage enrollment in level A (14%, while 35% was used as "normal"). The completion rate in level A is 55%, the same as the rate used as the "normal."

Although Northwest Campus enrolls fewer students (31%) in level A than the "normal" indicates (35%), the better than "normal" completion rate (58%, while the "normal" is 55%) causes the nominal overage of 6%.

South Campus has both a high percentage enrollment and a high percentage completion rate in level A. These compound to yield a 96% overage in level A completions.

For level B, Northeast Campus has a large underage (-56%). Although Northeast Campus has its greatest percentage enrollment in level B, both enrollment percentage and completion rate are far below "normal" and contribute to the significant underage in completion.

Northwest Campus has a 39% overage in level B. The high enrollment percentage (51%, while 45% is "normal") and the better than "normal" completion rate (58%, while 55% is "normal") both contribute to this overage in completion.

South Campus has a nominal underage (-9%) for level B, with slightly less than "normal" enrollment (42%, while 45% is "normal") and less than "normal" completion rate (49% while 55% is "normal"), contributing to the nominal underage in completion.

For level C, Northeast and South Campuses have nominal underages (-5% and -3%, respectively), while Northwest Campus has an overage (+14%) in completion.

Northeast Campus has a much greater percentage of its Mathematics 1403 students enrolled in level C than does either of the other two campuses (NE-33%; NW-18%; S-15%). This 33% represents a 5% underage when "normalized." This, coupled with a lower than

"normal" completion rate (49%, while 55% is "normal"), yields the nominal underage in completion for Northeast Campus.

Northwest Campus has 18% of its Mathematics 1403 students enrolled in level C, while 20% is assumed "normal." Thus, it is the better than "normal" completion rate (61%, while 55% is "normal") which not only offsets the underage in enrollment, but also yields a 14% overage in completion in level C in Northwest Campus.

Grade Distributions

Grade distributions by level were determined and are shown in the figure below for the two-year period. The mean and standard deviation for all passing grades (A, B, C, and D) are given in Appendices IV-4 through IV-6.

Figure 4-12

Grade Distributions, 1980-81 and 1981-82

	% A	% B	% C	% D	% W/F
Level A					
NE	31	15	8	2	44
NW	16	22	13	6	43
S	19	22	16	4	38
Level B					
NE	10	12	9	4	64
NW	19	19	15	6	42
S	16	20	11	4	50
Level C					
NE	16	15	14	4	51
NW	20	26	13	2	39
S	12	19	20	5	44

For level A, more than 40% of the students on South Campus and Northeast Campus earn a grade of A or B, despite the fact that the enrollment patterns in Mathematics 1403 are very different on the two campuses; Northeast Campus has 14% of its Mathematics 1403 enrollment in level A, while South Campus has 48% at that level.

For level A, the distribution of passing grades for Northeast Campus is strongly skewed toward the grade of A, while the distributions for Northwest Campus and South Campus more nearly fit the normal curve. The highest means for any level are found in level A on Northeast Campus, ranging from 3.22 to 3.43. The students in level A on Northeast Campus tend either to make A's (31%) or to withdraw from the course (44%).

The second highest set of means is for level C on Northwest Campus, ranging from 3.01 to 3.09. The grade distribution for this level shows 20% of the grades are A's, 26% are B's, 13% are C's, and 39% are W's and F's. The 39% withdrawal rate is the second lowest withdrawal rate of any level on any campus. The high means for passing grades is influenced by the 94% SCR for students taking level C on Northwest Campus after having completed level B on Northwest Campus. (See Appendix IV-8.)

The grade distribution for level B on Northeast Campus shows a very small percentage of passing grades. The withdrawal rate of 64% is the highest for any level on any campus.

Completion Rates Allowing Three Attempts

Some students who do not complete a given level of Mathematics 1403 in one semester do re-enroll and complete that level in a later semester. In order to determine the true SCR considering this re-enrollment factor, a computer search was carried out on the records of all students enrolled in Mathematics 1403 during fall 1980 (1-81).

Figure 4-13

SCR For Re-Enrollees

	Math 1403 Fall 1980 (1-81)	First course - three attempts allowed
NE	40.6%	49.9%
NW	60%	65.4%
S	60%	65.9%

Northwest Campus and South Campus had much higher completion rates on the first attempt. Northeast Campus showed a 9.3% increase on the second and third attempt, while Northwest Campus and South Campus showed 5.4% and 5.9% increases, respectively. This indicates that although the completion rate is low on Northeast Campus during the first attempt, a significant number of students do complete the course on their second or third attempt.

Completion of a Second Math Course After Enrolling In Mathematics 1403

The percentage of students who, after completing a level of Mathematics 1403 in fall 1980, enrolled in a second mathematics course and successfully completed it during their first attempt was determined by computer for each campus.

Figure 4-14

Percentage of Completion For Second Math Course
After Completing Level of Mathematics 1403 in Fall 1980

NE	16.6%	$\frac{114}{688}$
NW	20.5%	$\frac{118}{575}$
S	19.6%	$\frac{285}{1452}$

The denominators represent the full enrollment in Mathematics 1403 for fall 1980. The numerators represent those students who completed Mathematics 1403 in the fall and then re-enrolled in a second math course at some later semester and completed that second course in the first attempt. Although Northwest Campus had a smaller initial enrollment than Northeast Campus, more students from Northwest Campus completed a second math course than did students from Northeast Campus.

On the following pages charts show a breakdown of completion, non-completion, re-enrollment, and non-re-enrollment.

Figure 4-15

Northeast Campus

Mathematics 1403 Enrollment For Fall 1980

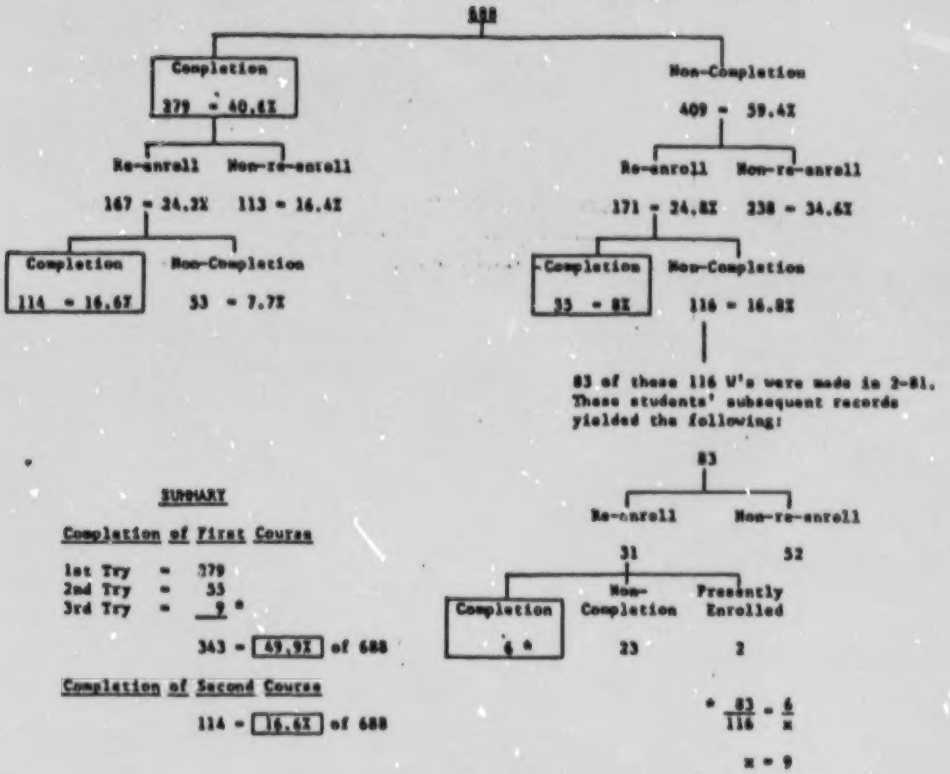
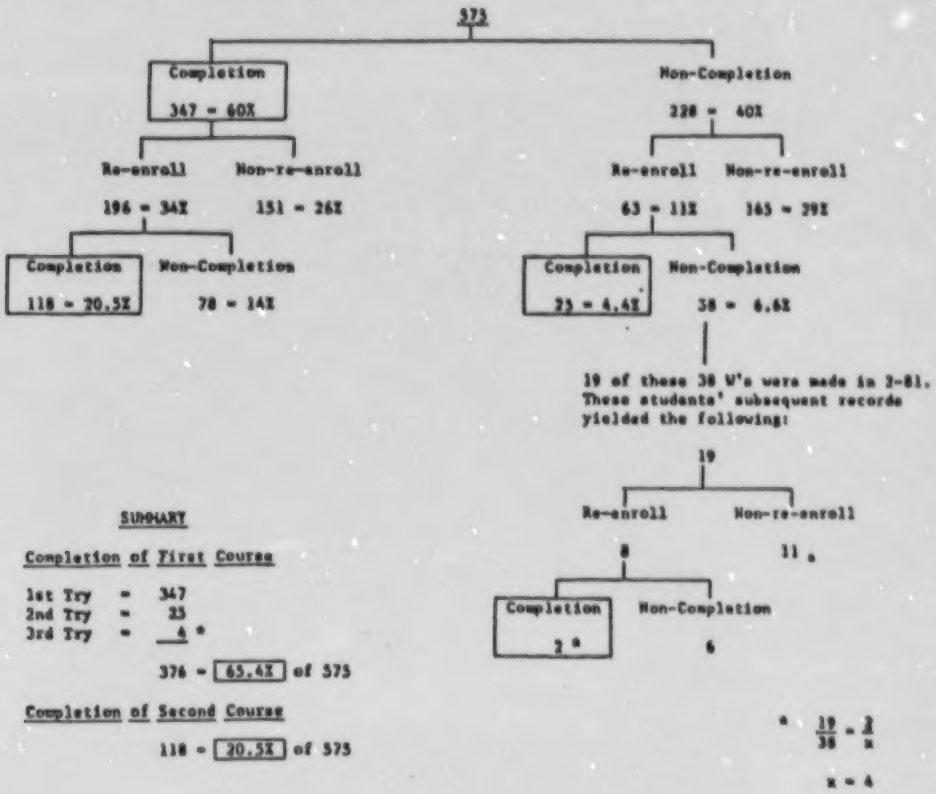


Figure 4-16

Northwest Campus

Mathematics 1403 Enrollment For Fall 1980



SUMMARY

Completion of First Course

1st Try = 347
2nd Try = 25
3rd Try = 4 *

376 = 65.4% of 575

Completion of Second Course

118 = 20.5% of 575

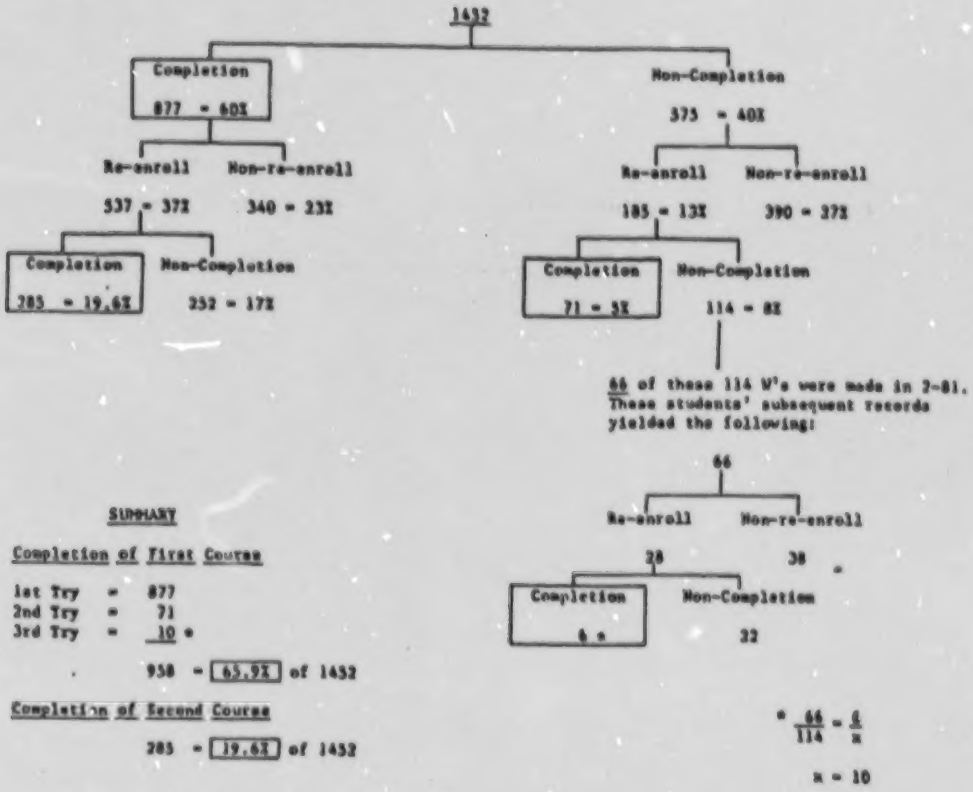
* $\frac{19}{38} = \frac{2}{x}$

$x = 4$

Figure 4-17

South Campus

Mathematics 1403 Enrollment For Fall 1980



SUMMARY

Completion of First Course

1st Try	=	877
2nd Try	=	71
3rd Try	=	10 *
		958 = 65.9% of 1432

Completion of Second Course

785 = 19.6% of 1432

Completion Rate in Sequential Courses

The three levels of Mathematics 1403 are intended to be highly sequential; the skills of level A are necessary for success in level B, and the skills of level B are necessary for success in level C. Furthermore, the skills in certain of these levels are prerequisite to success in each of the other mathematics courses offered. In order to determine the effect on the completion rate in a sequential level or course after the completion of a level of Mathematics 1403, a computer search was done on the records of students enrolled in Mathematics 1403 during three long semesters, fall 1980, spring 1981, and fall 1981. (See Appendixes IV-7, IV-8, and IV-9.)

Students who complete level A and enroll in level B have a much higher SCR in level B than students who enroll directly in level B. This is true on each campus.

Figure 4-18

Comparison of SCR's, Level B

	SCR in Level B for Students Who Complete Level A	SCR in Level B For All Students
NE	56%	34%
NW	85%	59%
S	57%	49%

The percentage of students who chose to enroll in level B after completing level A was noted.

Figure 4-19

Percentage Enrollment, Level B After Completing Level A

NE	17%	25/148
NW	26%	79/302
S	31%	405/1315

The denominators (148-302-1315) represent students who successfully completed level A, and the numerators (25-79-405) represent those students who subsequently chose to enroll in level B.

On all campuses, students who complete level B and enroll in level C have a much higher SCR than students who enroll directly in level C.

Figure 4-20

Comparison of SCR's, Level C

	SCR in Level C for Students Who Complete Level B	SCR in Level C For All Students
NE	64%	52%
NW	94%	62%
S	65%	57%

Again, the percentage of students who chose to enroll in level C after completing level B was noted.

Figure 4-21

Percentage Enrollment, Level C, for Students Completing Level B

NE	42%	$\frac{151}{357}$
NW	23%	$\frac{117}{504}$
S	47%	$\frac{352}{752}$

The denominators (357-504-752) represent students who successfully completed level B, and the numerators (151-117-352) represent those students who then chose to enroll in level C.

SCR's for students enrolling in College Algebra or College Algebra with Business Applications after completing one or more levels of Mathematics 1403 were studied.

Figure 4-22

SCR's for Algebra After One or More Levels of Mathematics 1403

	NE	NW	S
College Algebra 1633	61%	61%	45%
College Algebra/ Bus. Applic. 1603	69%	62%	66%

The SCR's in College Algebra after completing one or more levels of Mathematics 1403 varied from a low of 45% on South Campus to a high of 61% on Northeast Campus and Northwest Campus. For College Algebra with Business Applications, the range was from a low of 62% on Northwest Campus to a high of 69% on Northeast Campus.

Although there was little movement from Mathematics 1403 into the mathematics courses for liberal arts students, the SCR's were high for those students who did choose this route.

Figure 4-23

SCR's for Liberal Arts Mathematics After Mathematics 1403

	NE		NW		S	
Mathematics 1613	75%	9/12	93%	13/14	84%	44/52
Mathematics 1623	100%	1/1	100%	1/1	100%	3/3

There was also very little movement into statistics from Mathematics 1403, but the SCR's were high.

Figure 4-24

SCR's for Statistics After Mathematics 1403

	NE		NW		S	
Mathematics 1673	100%	7/7	100%	6/6	58%	7/12

As the data tables indicate, some students evidently completed a level of Mathematics 1403 to refresh their skills before registering for an upper level mathematics course.

Figure 4-25 shows the enrollment rate for students completing a level of Mathematics 1403. On South Campus, of the 4247 students who completed a level of Mathematics 1403, 1182 of these chose to take a next mathematics course. This yielded the highest rate (28%) of all campuses for enrollment in a sequential mathematics course.

Figure 4-25

Enrollment in a Sequential Mathematics Course

After Completing a Level of Mathematics 1403

NE	21%	$\frac{432}{2014}$
NW	22%	$\frac{370}{1653}$
S	28%	$\frac{1182}{4247}$

The total SCR for students re-enrolling in a next mathematics course after completing a level of Mathematics 1403 is shown for each campus.

Figure 4-26

Total SCR's for a Sequential Mathematics Course

After Completing a Level of Mathematics 1403

NE	65%	$\frac{280}{432}$
NW	81%	$\frac{299}{370}$
S	60%	$\frac{711}{1182}$

The highest overall completion rate (81%) for students who enroll in a sequential course occurs on Northwest Campus.

Enrollments, Re-enrollments, and Completions in Program (Dynamic Model)

In order to give a more precise view of what happens to students as they progress from one level to another, total enrollments by level for the three semesters (fall 1980, spring 1981, and fall 1981)

were viewed with regard to completion, re-enrollment in next level, and completion in next level. (See Appendix IV-10.)

Figure 4-27

Level A to Level B

	Original Enrollment in Level A	Completion of Level A	Re-enrollment in Level B	Completion of Level B	Percent of Original Enrollment in Level A Completing Level B
	N	N	N	N	%
NE	273	148	25	14	5
NW	534	312	79	67	13
S	2123	1315	405	229	11

Figure 4-28

Level B to Level C

	Original Enrollment in Level B	Completion of Level B	Re-enrollment in Level C	Completion of Level C	Percent of Original Enrollment in Level B Completing Level C
	N	N	N	N	%
NE	1062	357	151	97	9
NW	849	504	117	110	13
S	1521	752	352	229	15

Figure 4-29

Level C to First 1600* Level Course

	Original Enrollment in Level C	Completion of Level C	Re-enrollment in first 1600 course	Completion of first 1600 level course	Percent of Original Enrollment in level C completing first 1600 level course
	N	N	N	N	%
NE	705	354	219	145	21
NW	270	168	132	82	30
S	603	343	273	163	27

Figure 4-30

Total of Level A, B, and C to Sequential Course

	Original Enrollment Levels A,B & C	Completion in Original Level	Re-enrollment in next Level	Completion in next Level	Percent Completion in next level
	N	N	N	N	%
NE	2040	849	395	256	13
NW	1653	984	328	259	16
S	4247	2310	1030	621	15

These completion and re-enrollment rates were then applied to a model in which 100 students were placed in each level of Mathematics 1403 on each campus. The underlying assumption in this model is that the re-enrollment and completion rates calculated for students progressing through the math program are valid regardless of level of first enrollment. In other words, when the rates were calculated there was no determination as to whether the students completing level B and re-enrolling in level C had first completed level A.

The interim results of this modeling are shown in the table below.

Figure 4-31

Number of Progressive Enrollments and Completions Generated by a Group of 100 Students on Each Campus

	NE				NW				S			
	A	B	C	Total	A	B	C	Total	A	B	C	Total
Prog. Enr.	18	59	46	= 123	37	59	27	= 123	61	47	22	= 130
Comp.	10	19	25	= 54	23	32	17	= 72	38	23	13	= 74

An extrapolation using true enrollments for each campus yielded the data in Figure 4-32.

Figure 4-32

Number of Progressive Enrollment
Using True Enrollments

	Northeast Campus				Northwest Campus				South Campus			
	A	B	C	Total	A	B	C	Total	A	B	C	Total
Prog. Enr.	515	1693	1315	3523	811	1292	585	2688	3448	2679	1233	7360
Comp.	286	551	707	1544	500	709	363	1569	2114	1322	713	4149
Comp. / Enr. =	56%	32%	55%	44%	62%	55%	61%	58%	61%	49%	58%	56%

Several conclusions may be drawn from this model:

* The completion rates for each campus using this dynamic model are very similar to those calculated in the static model. Northeast Campus had a 44% completion rate, versus a 43% completion rate from the static model. This increase is due to the inclusion of progressive enrollments into the first 1600 level course and the completion thereof. The SCR's for Northwest and South Campuses, 58% and 56%, respectively, are exactly the same as obtained in the static model.
* Students on Northwest Campus have a better SCR through the progressive levels than do their counterparts on the other campuses.

Figure 4-33

Completion Rates for Northwest Campus

First Level of Enrollment	SCR
Level A	62%
Level B	55%
Level C	61%

* Students on South Campus have the next highest SCR through the progressive levels.

Figure 4-34

Completion Rates for South Campus

First Level of Enrollment	SCR
Level A	61%
Level B	49%
Level C	58%

* Students on Northeast Campus have the lowest SCR through the progressive levels.

Figure 4-35

Completion Rates for Northeast Campus

First Level of Enrollment	SCR
Level A	56%
Level B	32%
Level C	55%

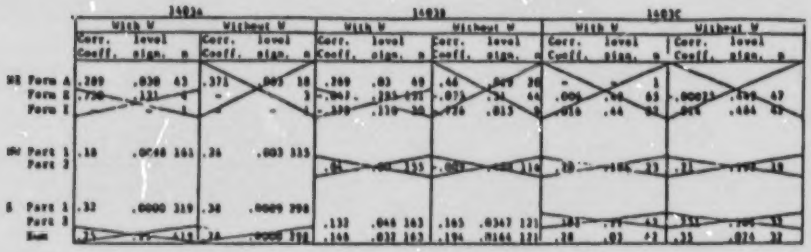
* The SCR of 32% for student beginning in Level B on Northeast Campus is the lowest of all rates. This is followed by the 49% SCR for students beginning in Level B on South Campus.

Relation of Placement Scores and Completion of the Course

The coefficient of correlation between placement score and grade in the course was calculated for students who took the placement exam in fall 1980 (1-81) and enrolled in Mathematics 1403 that semester.

Figure 4-36

Correlation Coefficients for Placement Exams



Prior to the calculation of coefficients of correlation, it was decided that an acceptable level of significance would be .05 or better. The smallest sample size to be considered would be thirty. Therefore, many results were eliminated because the correlation coefficient or level of significance was unacceptable or because the sample size was less than thirty.

For level A, each campus had an acceptable placement instrument. The correlation coefficients for South Campus's level A instrument is most acceptable due to the large sample size and very small level of significance. For the same reasons, Northwest Campus's level A instrument is second in acceptability. The smaller sample size and larger level of significance show that Northeast Campus's level A instrument ranks third and is unacceptable when tested without the W grades.

For level B, South Campus's Part 2 and Sum were acceptable. Northeast Campus's Form A was acceptable. The small sample size, in relation to the sample size for Form E, calls for caution. Form A is intended for arithmetic, level A, and is used for placement into or out of level A.

For level C, the only acceptable instrument was the Sum from South Campus. Again the small sample size calls for caution. South Campus has been using Part 2 to place students in level C (with a minimum score on Part 1).

Completion Rates for Lecture and Programmed Modes

The completion rates by level and campus for the two modes of instruction were determined using fall 1980 data. These rates are shown in Appendix IV-11.

For level A, the highest completion rate (73%) occurred in the sections taught by lecture mode on South Campus. The completion rate for level A programmed on South Campus was 61%. The lowest completion rate for level A (53%) was on Northeast Campus.

For level B, the highest completion rate (62%) occurred on Northwest Campus, where all sections are taught in the programmed mode. The lowest completion rate for level B (26%) occurred in the programmed mode on Northeast Campus.

For level C, the highest completion rate (67%) occurred on Northwest Campus. The lowest completion rate (33%) was in the programmed mode on Northeast Campus.

Enrollment and Completion Rates Day and Evening

For each campus each semester the number of students enrolled in Mathematics 1403 during the day was greater than the number enrolled in the evening, and the rate of completion was greater for day students than for evening students.

Figure 4-37

	Day		Evening	
	Enr.	Comp.	Enr.	Comp.
NE	61%	43%	39%	37%
NW	61%	60%	39%	55%
S	59%	58%	41%	55%

Student/Teacher Ratios

Using enrollments for a two-year period, the student/teacher ratio in Mathematics 1403 for each campus was calculated.

Figure 4-38

Student/Teacher Ratios

	Student:Teacher
NE	36:1
NW	31:1
S	30:1

The enrollments for Northeast Campus and Northwest Campus included the technical mathematics students (Mathematics 1323 and 1333) who are clustered with the Mathematics 1403 students.

Sections Taught by Part-Time Instructors

The percentage of sections taught by part-time instructors on each campus varies.

Figure 4-39

Sections Taught by Part-Time Instructors

	% Sections Taught by Part-Time
NE	41%
NW	67%
S	45%
Total All Campuses	49%

Completion Rates for Full and Part-Time Instructors

The total SCR's for all full-time and part-time instructors were calculated for the semesters fall 1980, spring 1981, fall 1981, and spring 1982 with the following results:

Figure 4-40

SCR's for Full and Part-Time Instructors

	Full-time	Part-time
NE	43%	39%
NW	58%	57%
S	59%	54%

The full-time instructors had a higher SCR than the part-time instructors. On Northeast and South Campuses this was not only true as a total but was true each semester. On Northwest Campus the full-time instructors had a higher SCR for two of the four semesters, while the part-time instructors had a higher SCR for the other two semesters. As a total, the full-time instructors on Northwest Campus had a higher SCR than the part-time instructors.

The part-time instructor SCR's were studied further with respect to new part-time instructors and returning part-time instructors. No conclusive pattern developed.

Completion Rates For Individual Instructors

The SCR for each instructor who taught at least two sections of Mathematics 1403 during the four semesters from fall 1980 through spring 1982 was calculated and is shown in Appendixes IV-12 through IV-14.

On Northeast Campus the 17 instructors in this category taught a number of students ranging from 50 to 329. The SCR's ranged from a low of 23% to a high of 71%.

On Northwest Campus there were 14 instructors in this category. The number of students taught by these instructors ranged from 54 to 248, with SCR's ranging from a low of 51% to a high of 68%, a narrower range.

On South Campus there were 26 instructors in this category. The number of students taught by these instructors ranged from 64 to 562. The SCR's ranged from a low of 41% to a high of 73%.

The data show that while one instructor on Northeast Campus taught 244 students with a SCR of 71%, another instructor taught 387 students and had a 38% SCR. The instructor teaching 387 students, the largest number of students taught by anyone on Northeast Campus, had fewer students who completed than the instructor who taught 244 students, a broad range.

On Northwest Campus the instructor teaching the most students, 248, had a 54% SCR, while the instructor teaching 232 students had more students completing and a 62% SCR.

On South Campus the instructor teaching the most Mathematics 1403 students, 562, had a 66% SCR.

SCR's clearly vary for individual instructors; however, the SCR for an instructor is not directly proportional to the number of Mathematics 1403 students taught.

Students Withdrawing with an Average of 80 or Higher

Many students withdraw (non-SCR) for reasons other than a low average in the course. Using the fall 1982 enrollment, the number

of students with an average of 80 or higher was determined. This was done by level, mode of instruction, and campus. See Appendix IV-15.

Figure 4-41

Non-SCR 80 or Higher Grade Average

		Level				Level	
		A	B	C	A	B	C
NE	Lect.	-	15%	7%	16%	20%	14%
	Prog.	16%	27%	31%			
NW	Prog.	21%	19%	14%	21%	19%	14%
S	Lect.	10%	7%	4%	12%	16%	6%
	Prog.	14%	21%	9%			

Using the withdrawal rates for the fall 1982, the percentage of students withdrawing with an average below 80 was calculated by level, mode of instruction, and campus.

Figure 4-42

Non-SCR Below 80 Grade Average

		Level		
		A	B	C
NE	Lect.	-	48%	49%
	Prog.	22%	44%	31%
NW	Prog.	15%	14%	16%
S	Lect.	21%	13%	21%
	Prog.	20%	28%	36%

Lect. = Lecture

Prog. = Programmed

Students Withdrawing with an Average Less Than 60

For each level, mode of instruction, and campus, the number and non-SCR with an average of 60 or less was determined. See Appendix IV-16. For each level the highest non-SCR occurred on South Campus, and these students were all in the lecture mode. The non-SCR figures for Northeast Campus and Northwest Campus in the programmed mode were extremely low (0% to 4%).

Students Withdrawing After An Initial Grade Less Than 70

For each level, mode of instruction, and campus, the number and percentage of students withdrawing after making an initial grade less than 70 was determined. See Appendix IV-17.

The high for each level and mode of instruction occurred on Northeast Campus. In level A on Northeast Campus, 10% of the students enrolled in that level withdrew after making a test grade less than 70. In level B, programmed and lecture on Northeast Campus, 24% of the students enrolled in that level withdrew after making a test grade less than 70. In level C on Northeast Campus, 17% of the lecture students and 11% of the programmed students withdrew after scoring less than 70.

Weekly Withdrawal Rates

For each level and mode of instruction on each campus the weekly withdrawal rates were calculated for weeks two through fourteen of the semester. See Appendix IV-18 through Appendix IV-20.

Withdrawal peaks occurred during the weeks listed:

Figure 4-43

Withdrawal Peaks by Week

	A Level Programmed	A Level Lecture
NE	Weeks 8 and 14	---
NW	Weeks 7 and 13	---
S	Weeks 5 and 14	Weeks 8, 9 and 14
	B Level Programmed	**B Level Lecture**
NE	Weeks 6, 11 and 14	Weeks 9, 11 and 14
NW	Weeks 8, 10	---
S	Weeks 8, 12 and 14	Weeks 6 and 11
	C Level Programmed	**C Level Lecture**
NE	Weeks 9 and 14	Weeks 5 and 14
NW	Week 13	---
S	Week 14	Week 14

On Northeast Campus a withdrawal peak occurred during the 14th week for each level and mode of instruction. In fact, the largest number and percentage (13.2%) loss of students occurred at this time. South Campus also had withdrawal peaks during the 14th week for level and mode, except lecture for level B. Northeast Campus lost 153 students during the 14th week, while South Campus lost 116 students. Northwest Campus had its greatest loss, 31 students (4%), for all levels during the 13th week.

Withdrawal Rates and Content Being Studied at Time of Withdrawal

The withdrawal rates as related to content being studied were recorded for the fall semester 1982. In Appendix IV-21 through

Appendix IV-32 are a list of the unit tests, the content covered by these tests, and the withdrawal rate during study of this content. The number of unit tests per level varies from seven to ten. No determination of withdrawal rate per unit test could be made for the lecture mode in levels B and C on South Campus.

Peaks in withdrawals occurred for the following specific content:

Figure 4-44

	NE		NW		S	
	% W	Content	% W	Content	% W	Content
Programmed Level A	8	Ratio, Percent	8.1	Ratio, Percent	10.7	Multiplication and division of whole numbers, prime factorization
Lecture Level A					6.5	Multiplication and division of whole numbers, prime factorization
Programmed Level B	24	Algebraic Fractions	7.8	Intro. to Polynomials, Factoring, Long Division, Fractions	12.7	Arithmetic with Rational numbers, Applications
Lecture Level B	17	Algebraic Fractions				
Programmed Level C	17	Fractions	11	Properties of Reals	16.1	Properties of Reals
Lecture Level C	16	Real numbers and polynomials				

From the graphs for level A it can be seen that peaks in the withdrawal rates occur at Test Two (multiplication and division of whole numbers) and Test Six (ratio, proportion, and percent). The high withdrawal rates related to Test Two occurred in the programmed

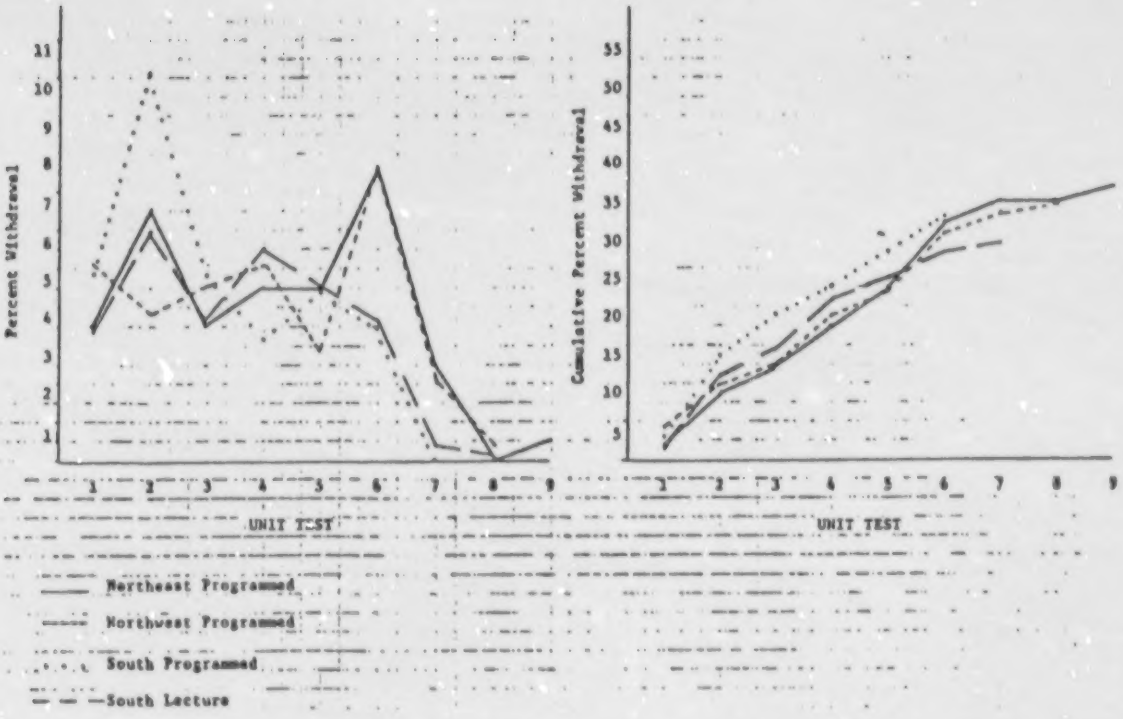
mode on Northeast and South Campuses and in the lecture mode on South Campus. The high withdrawal rates related to Test Six occurred in the programmed mode on Northeast and Northwest Campuses.

The cumulative withdrawal rates are lowest for South Campus, next lowest for Northwest Campus, and highest for Northeast Campus, the same picture as is reflected in the data from fall semester 1980.

Figure 4-45

Withdrawal Rates Per Unit Test

Level A



The withdrawal patterns for the programmed and lecture modes of level B on Northeast Campus are very similar. Each had a high withdrawal rate (9% and 11%, respectively) on Test One, a dip at Test Two, and progressively higher rates on Tests Three, Four, and

Five. Each of the two graphs peaked on Test Five (algebraic fractions). The programmed mode for Northeast Campus had the highest withdrawal rate (24%) on Test Five for any test in any level. The lecture mode for Northeast Campus had a 17% withdrawal rate for this same test.

The total withdrawal rate for the lecture mode of level B on Northeast Campus was at 63%, while the withdrawal rate for the programmed mode was at 71%. This is similar to the findings in the data from fall 1980 presented earlier; the withdrawal rate for the lecture mode (57%) was less than the withdrawal rate for the programmed mode (74%) on Northeast Campus.

The withdrawal patterns for the Northwest and South Campuses are similar in some respects. They both start low, rise to a peak, and then drop steadily.

The difference is that the graph for South Campus peaks higher and earlier, in regard to content. The peak (12.7%) for South Campus occurs at Test Three (arithmetic and rational numbers and applications). Northwest Campus has its peak (7.8%) at Test Five (introduction to polynomials and factoring).

The cumulative withdrawals in level B for the three campuses give the same overall results as were reflected in the data from fall 1980.

Figure 4-46

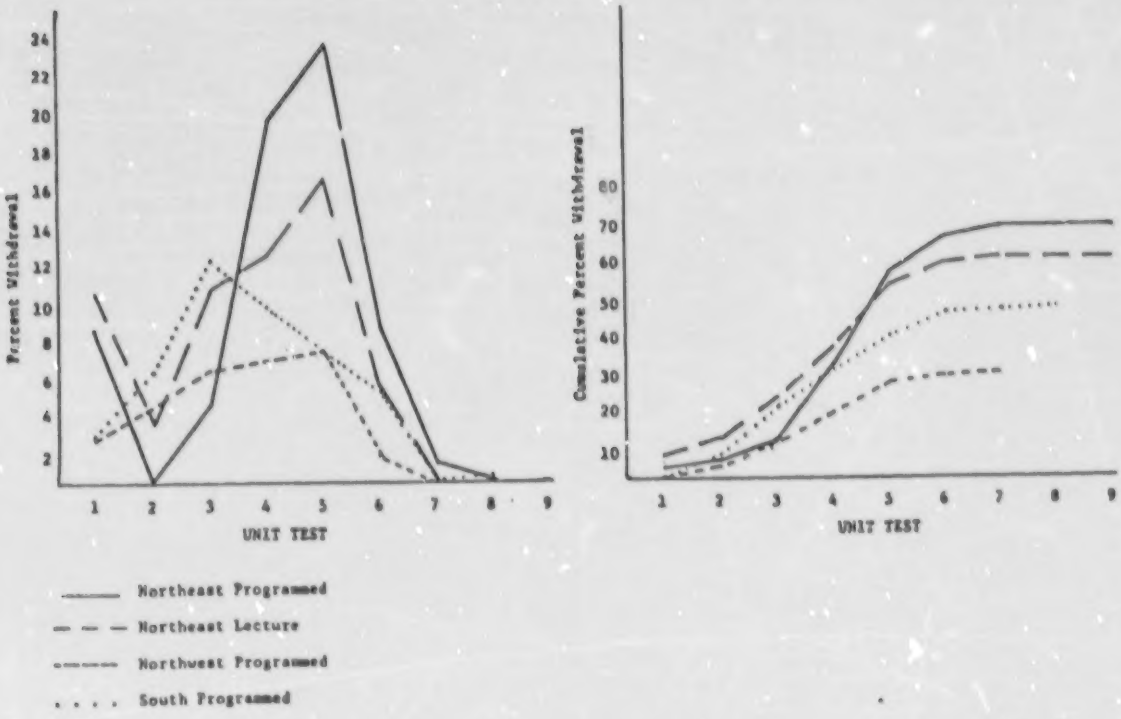
Level B Withdrawal Rates

	Fall 1980	Fall 1983
NE	67%	67%
NW	38%	36%
S	45%	49%

Figure 4-47

Withdrawal Rates Per Unit Test

Level B



From the graphs for level C it can be seen that the programmed mode on Northeast Campus has a profile different from the others. Three high distinct peaks occur at Tests Two (fractions), Four (radicals and complex numbers), and Seven (linear systems). The cumulative graph shows that while the withdrawal rate for the programmed mode on Northeast Campus starts lowest, it ends highest.

The highest withdrawal rate for the lecture mode of level C on Northeast Campus occurs at Test One (real numbers and polynomials). Other high rates occur at Test Five (quadratic equations and inequalities) and at Test Seven (linear systems).

For level C on South Campus and Northwest Campus in the programmed mode, the highest withdrawal rate occurs at Test One

(properties of the real numbers). These two campuses use a common textbook for this mode. At Test Three (polynomials), South Campus has a peak while Northwest Campus has a significant dip in withdrawal rate. The reverse is true for Test Five (polynomial fractions).

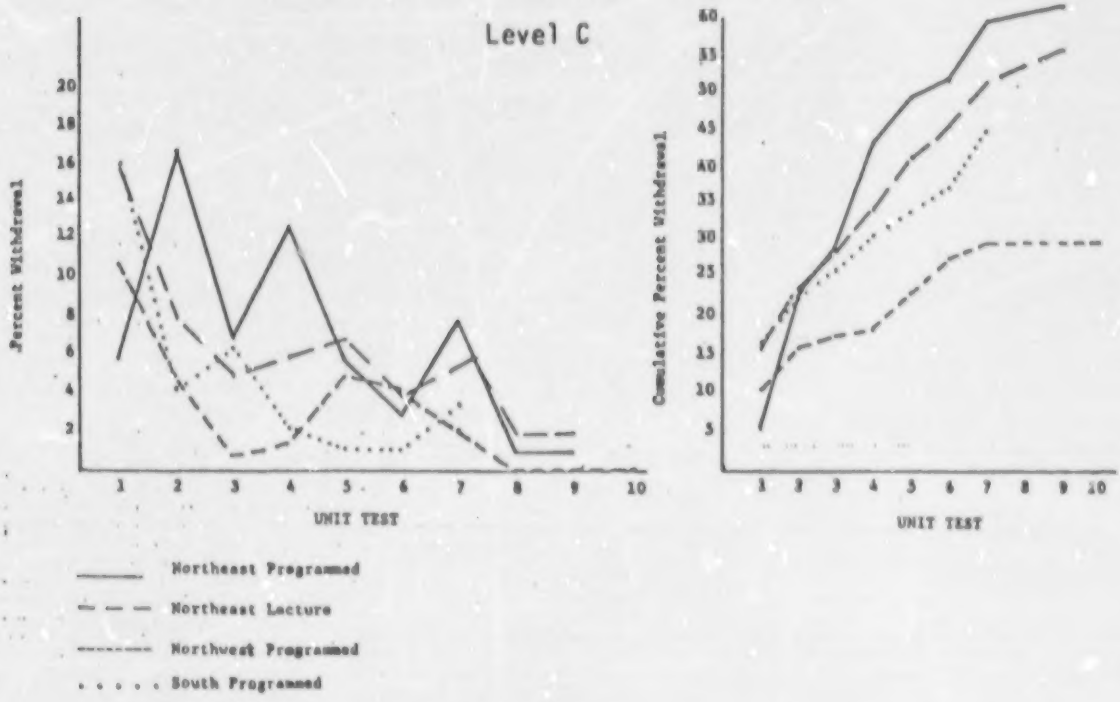
The graphs of the cumulative withdrawal rates indicate that Northeast Campus has the highest withdrawal rate in level C of any of the campuses, South Campus has the next highest, and Northwest Campus has the lowest, the same relationship portrayed in the data from fall semester 1980.

Thus, it can not only be concluded that very distinct withdrawal rates occur in each level on each campus, but it can also be concluded that the pattern of withdrawals in relation to unit test is unique for each level on each campus.

Figure 4-48

Withdrawal Rates Per Unit Test

Level C



CHAPTER V

CHARACTERISTICS OF STUDENTS ENROLLING IN MATHEMATICS 1403

SUMMARY

A study of twelve characteristics of students in the Mathematics 1403 courses on the three campuses during the spring 1983 semester shows that among the factors indicating that a student will not do well in Mathematics 1403 are age, sex, race, and basis for admission. A Post-Survey of non-completing students indicates that illness, personal problems, and/or inability to keep up with assignments were the most prevalent reasons for dropping the course. The majority of completing and non-completing student respondents said that they had achieved from the course what they had wanted; somewhat fewer non-completing students responded that their goals had not been met. Finally, the study indicates that "Math Anxiety" significantly affects completion. (See Appendix V-1, Explanation of Terms.)

INTRODUCTION

Team V analyzed the characteristics of the students in the Mathematics 1403 courses on the three campuses during the spring 1983 semester. Information was gleaned from several sources:

* The students' permanent records
* A Pre-Survey (which included two of the Fennema-Sherman Mathematics Attitude Scales) given to all students present in class on the eleventh and twelfth class days of the semester

* Scores on placement tests administered at the first of that semester
* A Post-Survey given with the final exam or mailed to students who withdrew from the course
* The final course grade for each student

The entire committee worked on the data to be considered from the permanent record and Pre-Survey and Post-Survey forms, with a representative from each campus responsible for administering the surveys. The project director worked with the Office of Research and with campus personnel to obtain data from permanent records and placement scores. The Office of Research assisted in processing the statistics in this portion of the study, particularly the correlation, cross-tabulation, multiple regression, and item analysis programs of SPSS.

In order to determine the characteristics which indicate that a student will (or will not) do well in Mathematics 1403, the cross-tabulation program of SPSS was used to display the responses to the questionnaire and the demographic data elements of the completers and non-completers. The stepwise multiple regression program of SPSS was run on the data to attempt to answer the question of whether a student's chances for successfully obtaining credit for the course could be predicted with any degree of accuracy.

Figures 5-1 through 5-9 in this chapter summarize, for each level on each campus, various characteristics of students more likely to complete and those less likely to complete the Mathematics 1403 course.

FINDINGS

Responses to Question One: "What are the Characteristics Which Indicate that a Student Will Not Do Well in Mathematics 1403?"

Data to answer this question were collected during the spring 1983 semester. Each student present in class on the first meeting of the third week of the semester was given a "Pre-Survey" (see Appendix V-2), which included eleven questions concerning prior math courses and length of time since those courses had been taken, the number of semester hours the student was taking, and the number of hours working per week. The survey asked the student to evaluate the amount of family responsibilities. The data from this survey, considered along with data from the student's permanent record, placement test scores, and the final grade, were studied to identify characteristics associated with students who do not successfully complete Mathematics 1403. The results are shown in Figures 5-1 through 5-9, representing each of the three levels of the course on each of the campuses.

The most frequent and the least frequent responses have been listed. Each level on each campus was considered independently. (A copy of the computer printout for the CROSS TABULATION is available but is not included as an appendix.)

A multiple regression program of SPSS was used to obtain linear regression equations. These multiple regressions were run using anxiety (ANX) and confidence (CON) scores, placement test (PT1 and PT2) scores, age (AGE), and previous hours (PREHRS) as the independent variables, and grade (GRADE) as the dependent variable. A major problem existed because of small N's on some levels on each

campus; therefore, some of the regression equations were inconclusive and thus are not included in this report.

Figure 5-1

Characteristics of Students

Level A, South Campus

DATA ITEM/ QUESTION	HIGHEST % COMPLETION	LOWEST % COMPLETION
Time of day	Evening: 57.0% of 270	Day: 54.1% of 462
Age	Over 30: 69.4% of 144	Under 31: 51.7% of 588
Sex	Female: 62.8% of 363	Male: 47.7% of 369
Race	Caucasian: 58.2% of 452	Black: 48% of 225 or Minority: 49.4% of 281
Current Admission	Cont. or Transfer: 58.6% of 350	IA or GED: 47.2% of 106
Previous Hrs.	16 or more: 67.6% of 182	15 or fewer: 51.1% of 550
Hi School Alg.	1 or 2 yrs: 72.3% of 300	None: 50.2% of 243
Time since Math	5+ years: 72.6% of 157	½ to 1 yr: 47.7% of 157
Responsibility	Moderate/ Great: 65.3% of 430	Little/none: 51.8% of 114
Expected Grade	A or B: 68.5% of 444	Other: 35.4% of 99
Reason in TCJC	Other: 65.8% of 433	Parental/ Fin. Aid: 49.5% of 97
Placement Test	More than 3: 63.4% of 317	Less than 4: 44% of 100

	COMPLETING		NONCOMPLETING	
	Mean	No.	Mean	No.
ANX Scores:	39.76	340	36.72	205
CON Scores:	42.14	340	38.59	205

Figure 5-2

Characteristics of Students

Level A, Northeast Campus

DATA ITEM/ QUESTION	HIGHEST % COMPLETION	LOWEST % COMPLETION
Time of day	Day: 59.6% of 109	Evening: 56.9% of 65
Age	Over 25: 66% of 50 (*over 30: 72.4% of 29*)	Under 26: 55.6% of 124
Sex	Female: 64.6% of 79	Male: 53.2% of 94
Race	Caucasian: 58.4% of 161	(*There were only 13 non-Cauc. out of 174 students)
Current Admission	Cont./ Transfer: 65.2% of 89	Other: 51.2% of 84 (Poorest risk: IA with only 21.4% of 14)*
Previous Hrs.	More than 15: 78% of 50	15 or fewer: 50.8% of 124
Hi School Alg.	1 or 2 yrs: 76.5% of 68	None: 56.3% of 64
Time Since Math	1 to 5 yrs: 74.6% of 59	Other: 62.5% of 72 (½ to 1 yr: 40% of 15)*
Responsibility	N O P A T T E R N	
Expected Grade	A: 94.1% of 34	Other: 58.2% of 98
Reason in TCJC	N O P A T T E R N	
Placement Test	20+: 69.4% of 62	19 or fewer: 38.5% of 98

	COMPLETING		NONCOMPLETING	
	Mean	No.	Mean	No.
ANX Scores:	37.51	89	35.66	44
CON Scores:	40.71	89	37.72	44

Figure 5-3

Characteristics of Students

Level A, Northwest Campus

DATA ITEM/ QUESTION	HIGHEST % COMPLETION	LOWEST % COMPLETION
Time of day	Evening: 54.0% of 87	Day: 48.9% of 94
Age	Over 30: 68.6% of 35	Under 31: 47.3% of 146
Sex	Female: 66.2% of 65	Male: 43.1% of 116
Race	Caucasian: 54.9% of 142 (There were only 37 minority students in 181.)	Minority: 37.8% of 37
Current Admission	Cont. or Transfer: 56.9% of 130	IA or Readm.: 38.8% of 49
Previous Hrs.	31+ : 67.7% of 31	15 or fewer: 48.5% of 136
Hi School Alg.	1 or 2 yrs: 67.7% of 65	None: 45.9% of 74
Time Since Math	1+ yrs.: 62.1% of 103	Other: 41.7% of 36
Responsibility	Moderate/ Great: 59.8% of 104	Little/ None: 46.7% of 30
Expected Grade	A: 75.7% of 70	Other: 36.8% of 68
Reason in TCJC	Pers. imp./ unemployed: 60.7% of 107	Other: 40% of 30
Placement Test	More than 10: 69.9% of 83	Less than 11: 26.5% of 49

	COMPLETING		NONCOMPLETING	
	Mean	No.	Mean	No.
ANX Scores:	41.95	78	38.18	61
CON Scores:	43.13	78	39.13	61

Figure 5-4

Characteristics of Students

Level 3, South Campus

DATA ITEM/ QUESTION	HIGHEST % COMPLETION	LOWEST % COMPLETION
Time of Day	Evening: 51.9% of 216	Day: 46.7% of 392
Age	Over 30: 56.5% of 131	Under 31: 46.3% of 477
Sex	Female: 52.5% of 276	Male: 45.2% of 332
Race	Caucasian: 49.2% of 441 Spanish: 50% of 32	Black: 40.5% of 111
Current Admission	Hi School: 64.2% of 53	IA or Readm.: 41.3% of 92
Previous Hrs.	16 or more: 53.7% of 242	15 or fewer: 45.1% of 366
Hi School Alg.	1 or 2 yrs: 62.4% of 300	None: 32.0% of 128
Prev. Coll. Math	None: 59% of 188	1403A: 46.3% of 240
Time Since Math	5+ yrs: 68.2% of 104	½ to 5 yr: 48.0% of 152
Responsibility	Moderate/ Great: 54.6% of 359	Little/ None: 51.8% of 112
Expected Grade	A or B: 59.2% of 387	Other: 29.8% of 84
Reason in TCJC	Personal imp: 56% of 361	Other: 49% of 104
Placement Test	9-12 on PT1: 59.3% of 123 0-3 on PT2: 61.0% of 59	0-8 on PT1 (should be in 1403A): 52.2% of 23*

	COMPLETING		NONCOMPLETING	
	Mean	No.	Mean	No.
ANX Scores:	42.18	255	39.36	217
CON Scores:	45.26	255	41.56	217

Figure 5-5

Characteristics of Students

Level B, Northeast Campus

DATA ITEM/ QUESTION	HIGHEST % COMPLETION	LOWEST % COMPLETION
Time of Day	N O P A T T E R N	
Age	31-40: 50.7% of 69	21-25: 32.2% of 143
Sex	Female: 45.9% of 205	Male: 32.2% of 261
Race	Caucasian: 39.2% of 413	Other: 28.0% of 50
Current Admission	HS, Cont., Trans: 39.6% of 396	IA or Readm.: 29.0% of 92
Previous Hrs.	N O P A T T E R N	
Hi School Alg.	1-2 yrs: 51.4% of 249	None: 25% of 88
Prev. Coll. Math	None: 45.4% of 240	1403A: 24.6% of 69
Time Since Math	1+ yrs: 47.3% of 169	0-1 yr: 34.7% of 170
Responsibility	Great: 50% of 64	Moderate/ Less: 39.3% of 280
Expected Grade	A: 55.8% of 120	Other: 33.5% of 221
Reason in TCJC	Pers. imp.: 44.2% of 285	Other: 33.3% of 48
Placement Test	PT2: 15+: 67.1% of 67	Below 15: 24.7% of 73
	PT3: N O P A T T E R N	

	COMPLETING		NONCOMPLETING	
	Mean	No.	Mean	No.
ANX Scores:	42.11	142	37.38	202
CON Scores:	44.72	142	39.59	202

Figure 5-6

Characteristics of Students

Level B, Northwest Campus

DATA ITEM/ QUESTION	HIGHEST % COMPLETION	LOWEST % COMPLETION
Time of Day	N O P A T T E R N	
Age	26-40: 61.2% of 98	Under 21: 55.2% of 105
Sex	Female: 56.6% of 136	Male: 50.5% of 184
Race	Caucasian: 53.7% of 285	Spanish: 36.4% of 22* *Total non-Caucasian only 35 out of 320
Current Admission	Other: 54.6% of 282	Readm.: 42.1% of 38
Previous Hrs.	All Above 52%	
Hi School Alg.	1-2 yrs: 62.9% of 167	None: 43.3% of 67
Prev.Coll. Math	None: 62.3% of 154	1403A: 48.5% of 66
Time Since Math	1+ yrs: 63.7% of 124	0-1 yr: 52.1% of 117
Responsibility	N O P A T T E R N	
Expected Grade	A: 68.4% of 117	Other: 48.8% of 125
Reason in TCJC	N O P A T T E R N	
Placement Test	18+ on PT1: 68.4% of 117 5+ on PT2: 71.7% of 51	17 or less: 52.8% of 89 4 or less: 53.8% of 78*

	COMPLETING		NONCOMPLETING	
	Mean	No.	Mean	No.
ANX Scores:	42.77	141	40.46	101
CON Scores:	44.68	141	43.17	101

Figure 5-7

Characteristics of Students

Level C, South Campus

DATA ITEM/ QUESTION	HIGHEST % COMPLETION	LOWEST % COMPLETION
Time of Day	Evening: 57.9% of 76	Day: 53.5% of 183
Age	Over 25: 62.9% of 97	21-25: 42.1% of 76
Sex	Female: 60.6% of 104	Male: 51.0% of 157
Race	Caucasian: 57.8% of 211	Minority: 41.9% of 43 (Black or Spanish)
Current Admission	Cont.: 57.1% of 217	Other: 43.2% of 44 Readm.: 29.2% of 24*
Previous Hrs.	Under 45: 56.4% of 211	45+: 48% of 50
Hi School Alg.	1-2 yrs.: 58.1% of 177	None: 54.5% of 33
Prev.Coll. Math	1403B: 56.7% of 150	None: 54.3% of 35
Time Since Math	0-6 mo: 59.9% of 142 5+ yrs: 80% of 10*	1/2-5 yr.: 48.3% of 58
No.Hrs. Work/wk.	None: 60.6% of 40	41+: 52.4% of 42
Responsibility	N O P A T T E R N	
Expected Grade	A: 65.5% of 84	Other: 52.4% of 126
Reason in TCJC	Personal imp. or Came for Fun only category with more than 30 responses: 58.7% of 172	
Placement Test	NO SIGNIFICANT DATA (N = 19)	

	COMPLETING		NONCOMPLETING	
	Mean	No.	Mean	No.
ANX Scores:	44.36	121	38.73	89
CON Scores:	47.49	121	43.20	89

Figure 5-8

Characteristics of Students

Level C, Northeast Campus

DATA ITEM/ QUESTION	HIGHEST % COMPLETION	LOWEST % COMPLETION
Time of Day	N O P A T T E R N	
Age	Other: 60.3% of 194	21-25 or 41-45: 53.9% of 102
Sex	Female: 61.0% of 123	Male: 56.4% of 172
Race	Caucasian: 58.8% of 274	Other: 50% of 20* (Only 20 non-Cauc. of 294)
Current Admission	HS & Cont.: 62.1% of 232	IA or Trans: 34.4% of 32
Previous Hrs.	16-45: 65.2% of 92	46+: 50.8% of 61 0-15: 56.6% of 143
Hi School Alg.	No alg.: 73.3% of 30	1-2 yrs.: 64.1% of 170
Prev.Coll. Math	1403B: 69.9% of 97	None: 63.1% of 83
Time Since Math	N O P A T T E R N	
No.Hrs. Work/wk.	None or 20+: 67.1% of 161	1-20: 59.0% of 39
Responsibility	Moderate/ Great: 67.4% of 147	Little/ None: 61.1% of 54
Expected Grade	A or B: 68.4% of 171	Other: 51.7% of 29*
Reason in TCJC	Personal Imp. or Came for Fun only category with more than 30 responses: 63.4% of 171	
Placement Test	20+ on PT2: 61.3% of 62 *25+ on PT2: 76.7% of 30 PT3: N O P A T T E R N	Below 25: 45% of 40

	COMPLETING		NONCOMPLETING	
	Mean	No.	Mean	No.
ANX Scores:	43.52	132	38.83	69
CON Scores:	45.71	132	42.36	69

Figure 5-9

Characteristics of Students

Level C, Northwest Campus

DATA ITEM/ QUESTION	HIGHEST % COMPLETION	LOWEST % COMPLETION
Time of Day	Evening: 68.5% of 54	Day: 59.4% of 101
Age	21+: 65.2% of 92	Under 21: 58.7% of 63
Sex	Female: 64.3% of 70	Male: 61.2% of 85
Race	Caucasian: 62.5% of 136	Minority: 58.8% of 17 (Only 17 Minority of 153)
Current Admission	Cont.: 67.5% of 120	HS, Trans., Readm.: 42.4% of 33
Previous Hrs.	0-15: 67.4% of 87	16-45: 53.2% of 47
Hi School Alg.	2 yrs.: 69.2% of 52	0-1 yr.: 65.4% of 52
Prev.Coll. Math	1403B: 65.3% of 75	NO PATTERN
Time Since Math	N O P A T T E R N	
No.Hrs. Work/wk.	20+: 73.7% of 57	0-20: 59.6% of 47
Responsibility	N O P A T T E R N	
Expected Grade	A: 83.7% of 43	Other: 55.7% of 61
Reason in TCJC	Personal Imp. or Came for Fun only category with more than 30 responses: 69.0% of 104	
Placement Test	15+ on PT1: 76.9% of 39 *(8-11 on PT2: 64.7% of 17)	NC PATTERN on PT1 (0-7 on PT2: 76% of 25)*

	COMPLETING		NONCOMPLETING	
	Mean	No.	Mean	No.
ANX Scores:	43.49	70	38.44	34
CON Scores:	46.36	70	42.38	34

Responses to Question Two: "To What Extent Do Students Feel Their Goals Are Being Met? Is There 'Success' Without Completion?"

The data for this study were gathered during the spring 1983 semester. Replies were tabulated from the Pre-Survey (see Appendix V-2) dealing with a student's reasons for enrolling in the course, the grade expected by the individual student, and reasons for enrolling in school. Replies from the Post-Survey (see Appendix V-3) were also tabulated, including the critical question dealing with whether the students' perceived goals were accomplished in terms of knowledge and grade. Students who dropped the course were asked the primary reason for dropping. The results of these surveys furnished the entire study of this question.

Most of the students signed up for the Mathematics 1403 courses because those courses were prerequisites for courses on their degree programs. A very high percentage of the students expected to make an A or B in the course, and very few expected to fail or drop the course. Reasons for being in school varied, with the largest number responding that they were here for personal improvement or for the fun of it. Please see Figures 5-1 through 5-9 for differences in campus responses on the three levels.

On the portion of the Post-Survey designed to furnish the reasons for dropping Mathematics 1403 courses, only two reasons were found to have sufficient responses to be at or above the lower limit of thirty cases. Both occur at the B level: thirty people on the South Campus responded that they could not finish the course because of illness or personal problems, and thirty-four on the Northeast Campus responded that they were unable to complete the course

because they fell behind in their work. The poor return rate for the Post-Surveys by students who did not complete the course probably explains the lack of conclusive answers to the specific reasons why people drop the course.

Uniformly more students answered "Yes" than "No" to question seven of the Post-Survey: "Did you achieve what you wanted to do in your math course?" The following chart shows the percentages of affirmative answers appearing on the survey:

South Campus	Northeast Campus	Northwest Campus
A Level 75% of 399	71% of 73	78% of 86
B Level 62% of 374	66% of 205	63% of 163
C Level 57% of 158	76.9% of 160	69% of 93

The above percentages reflect affirmative answers that were given by all students, those who did not complete the course, as well as those who did complete the course.

The following chart shows the percentage of affirmative answers by non-completers:

South Campus	Northeast Campus	Northwest Campus
A Level: 28% of 84	17.6% of 17	42.9% of 14
B Level: 13.9% of 101	10.2% of 59	13.8% of 29
C Level: 28.6% of 35	0% of 12	0% of 8

Although the number of responses was small, the results seem to indicate that there is success without completion.

Correlation coefficients were computed for the Mathematics 1403 grades (using completion/non-completion) and the scores on the Fennema-Sherman Attitude Scales. Correlation coefficients were also calculated for the scores of the TCJC students on the two separate scales. (See Appendix V-4.) The means of the TCJC student scores were compared to the means of the scores for students tested by Fennema and Sherman on both the "Anxiety Scale" and the "Confidence in Learning Mathematics Scale" to determine whether there was a significant difference. Finally, the means of the scores on the two attitude scales were compared, level by level, and campus by campus, to determine whether there were differences in attitudes on the different campuses and whether anxiety was a correlated factor to the completion rate in Mathematics 1403.

A total of 3231 student cases were considered for this study: 1615 from the South Campus, 957 from the Northeast Campus, and 659 from the Northwest Campus. Data items obtained from the permanent records are complete for each student, but data elements are missing from each of the other sources: Pre-Survey (including the "Anxiety" and "Confidence in Learning Mathematics" scores), placement tests, and Post-Survey responses. These elements missing for some students reduced the amount of useable data. All items for which data are included in this report had responses of more than thirty (except those marked with an asterisk *), and the significance level of all tests was 0.05 or better.

Responses To Question Three: "Is Math Anxiety A Correlated Factor To The Completion Rate?"

Two scales from the Fennema-Sherman Mathematics Attitude Scales were administered to the students as part of the Pre-Survey: the "Confidence in Learning Mathematics Scale" (CON) and the "Mathematics Anxiety Scale" (ANX). The twenty-four items from the two scales were machine scored. Items were randomly distributed within the two scales. The Split-Half Reliability of the "Confidence in Learning Mathematics Scale" is listed by Fennema and Sherman as .93, and that of the "Mathematics Anxiety Scale " is listed as 0.89. The authors found the correlation of the two scales we used to be 0.89.

The correlation coefficients of the ANX scores compared to the CON scores computed for the TCJC groups determined that the scores on the two scales are positively correlated at the 0.001 level, although the correlation coefficients for no groups are as high as that of the authors' group. (See Appendix V-4, "Correlation: Anxiety to Confidence.") The 0.001 significance level existed for the correlation coefficients on all the nine categories, three levels on each of the three campuses, and within those groups divided into men and women subgroups.

The TCJC campus means were individually compared to the means found by the authors of the scales. (See Appendix V-5 for those means.) A computer program was written for comparing the difference of means at the 0.05 level, with samples divided by sex, as in the Fennema and Sherman study.

At the A level, no significant difference was found in the ANX

score, but each of the six groups (three campuses, two sexes each) had significantly lower mean scores on the CON than Fennema and Sherman had found for their samples.

At the B level several differences showed up. On the ANX, the Northwest Campus male group scored higher (indicating less anxiety toward mathematics) than the male Fennema-Sherman group. On the CON, all B level groups scored lower than the Fennema-Sherman group, but the Northwest Campus male group difference was not significant at the 0.05 level, as were the others.

At the C level there were a number of differences, too. On the ANX, both the South Campus female group and the Northeast Campus male group scored higher than the respective Fennema-Sherman group. On the CON, the female groups on all three campuses scored lower than the female group tested by the authors.

For a table of correlation of grade (completion/non-completion) with the ANX score and CON score, please see Appendix V-6. These data illustrate that TCJC Mathematics 1403 students' scores on these scales correlate positively with whether the students completed or failed to complete the courses except that the significance levels for the Pearson's correlation coefficients for the Northeast Campus ANX scores (A level and the Northwest campus CON scores (B level) don't meet the significance level criteria set for this study.

When the differences in means on the scales for all students (regardless of sex) in each of the nine categories were compared across campuses, it was found that the Northeast Campus students scored well below those on Northwest Campus on the ANX in the A

level, but no difference in the means appeared in the CON scores. At the B level, on both ANX and CON scales South Campus and Northwest Campus mean scores were greater than those on Northeast Campus. There were no significant differences on the scores on either scale for the three campuses on the C level. See Appendix V-7, for the means of the students in the nine categories (three levels on each of the three campuses).

The findings show that math anxiety, as tested by the two Fennema-Sherman scales, is a correlated factor to the completion rate for Mathematics 1403.

CONCLUSIONS

The three purposes of this study were 1) to assess the student completion rate in Mathematics 1403, 2) to identify factors affecting the student completion rate, and 3) to determine ways the student completion rate could be improved. The first two of these purposes are dealt with in this summary, and the third is dealt with in the final section, "Recommendations."

Assessment of the Student Completion Rate

While the student completion rate in Mathematics 1403 at Tarrant County Junior College, 52.5%, seems low in comparison to the 73% student completion rate for all courses at TCJC, it is above average for similar courses offered in other Texas junior colleges.

On the three campuses at TCJC, the percentage of total campus enrollments in Mathematics 1403 varies, with Northeast Campus at 2.72%, Northwest Campus at 3.25%, and South Campus at 3.63%. The enrollment distribution by level, A, B, and C, is unique on each campus. Northeast Campus* has a distribution of 14%, 47%, and 33% for the A, B, and C level, respectively; Northwest Campus has a distribution of 31%, 51%, and 18%; South Campus* has a distribution of 48%, 36%, and 15%.

* No level found for 6% on Northeast Campus and 1% on South Campus.

The student completion rate is different for each campus, with Northeast Campus at 42%, Northwest Campus at 58%, and South Campus at 56%. Also, differences exist for each level.

	Campus	SCR
Level A	NE	55%
	NW	57%
	S	62%
Level B	NE	36%
	NW	58%
	S	49%
Level C	NE	43%
	NW	58%
	S	56%

Northeast Campus not only has the lowest overall student completion rate in Mathematics 1403 of the three campuses, but it also has the lowest rate in each of the three levels.

Identification Of Factors That Affect The Student Completion Rate

The following factors were identified as variables which could affect the student completion rate.

Course Content: For each level of Mathematics 1403, there is a common core of content covered on each campus, but there are several additional units taught which vary from campus to campus.

Text: Different texts are used on the campuses except that Northwest Campus and South Campus use the same texts for the programmed mode.

Evaluation of Students: The thoroughness with which testing is done and the rigor of the individual tests appears to be equivalent from level to level on a campus and from campus to campus for each level. However, there are differences with regard to retesting options, grade which can be made on retest, removal from a mode of instruction (or the course) if low test scores are made, and requirement of passing the final in order to pass the course.

Placement of Students: A different set of mathematics placement instruments is used on each campus. There is no strong overall assurance that a student being placed in a given level on one campus would be placed in the same level on another campus.

Alternate Modes of Instruction: Two modes of instruction, lecture and programmed, are used on Northeast and South Campuses. All sections on Northwest Campus are taught in the programmed mode. While the lecture mode when compared to the programmed mode has a higher completion rate on a single campus, the programmed mode on Northwest Campus in levels B and C has a higher completion rate than either method on the other campuses.

Classroom Allocation: On Northwest and South Campuses instruction is provided in a separate (self-contained) classroom, while on Northeast Campus the students in the programmed mode receive instruction in a portion of an open tutorial laboratory which has been partially partitioned for classroom use. On Northwest and

South Campuses the separate classroom for teaching is supported by a testing laboratory. Higher completion rates occur in the self-contained classrooms supported by testing laboratories.

	Classroom Used	SCR
NE	partitioned space	42%
NW	self-contained classroom	58%
S	self-contained classroom	56%

Support Facilities: Support laboratories for testing and tutoring exist in some form on each campus. These laboratories form a vital part of the Mathematics 1403 program.

The large enrollment, multiple levels in the course, large number of tests per level, self-paced nature of the course, and options for retesting call for a well-organized support system. Testing, grading, maintenance of test materials, and record keeping of student progress and scores demand high priority. Tutoring and tutoring materials are essential to the program.

On Northwest and South Campuses the laboratory facilities are very similar physically and functionally; two separate rooms, one for testing and one for tutoring, are available. On Northeast Campus the support laboratories are in combination with the large open tutorial space used for programmed sections. Testing for programmed sections occurs in a portion of this space; testing for lecture sections occurs in the campus testing area of the Student Union Building.

Class Size: In the Mathematical Association of America's report of July 1980 one of the characteristics of effective remedial programs

is a ratio of students to teacher not greater than 30:1 in courses that include topics in arithmetic and elementary algebra. The student to teacher ratios for the campuses are as follows:

	Student/Teacher Ratio	SCR
NE	36:1	42%
NW	31:1	58%
S	30:1	56%

Higher SCR'S occur at lower student/teacher ratios.

Support Staff: Support staff may be defined as those involved in clerical work, maintenance of materials, record keeping activities, and some tutoring if they are qualified. On Northwest and South Campuses the available personnel are used to staff the testing/tutoring laboratories. Northeast Campus has a secretary and student assistants. The student assistants are used to assist the instructor in programmed sections during class time; they also attend the math table, answering students' questions, and administering tests for the programmed sections.

While tutoring is an important facet of the program, Mathematics 1403 classroom work under the instructor's direct supervision is separate and distinct from tutoring by lab personnel or student assistants outside class time.

Grade Distribution: The grade distributions for passing grades on Northwest and South Campuses were similar by level and tended to peak on the grades of B or C.

On Northeast Campus the grade distributions showed that stu-

dents tended to make A's or withdraw from the course in levels A and C. In level B, a comparatively small percentage of passing grades was made; the 64% withdrawal rate is the highest for any level on any campus.

Re-enrollees: Allowing a student to re-enroll and complete a level of Mathematics 1403 does contribute positively to the student completion rate. Each campus' rate increased by at least 5% when three attempts were allowed. The Northeast Campus student completion rate increased from 40.6% to 49.9%; Northwest Campus' rate increased from 60% to 65.4%; South Campus' rate increased from 60% to 65.9%.

Completion of a Previous Level(s)

The student completion rate in a second mathematics course after completing a level of Mathematics 1403 varies by campus and is directly related to the student completion rate in Mathematics 1403 for that campus.

	SCR Math 1403	SCR Subsequent Math
NE	42	16.6%
NW	58	20.5%
S	56	19.6%

Furthermore, it was found that students enrolling in a level of Mathematics 1403 after having completed the previous level have a much higher rate of completion than those placed directly into the level. This is true for levels B and C on all three campuses.

The student completion rates for students taking College Algebra or College Algebra with Business Applications were above 60% except for College Algebra on South Campus. Thus it can be concluded that one of the purposes of Mathematics 1403, to prepare students for college-level courses in mathematics, is indeed being accomplished.

Campus

Using a dynamic model of enrollment and completions through the progressive levels, it was found that students on Northwest Campus have a better student completion rate for each level, those on South Campus have the next best, and those on Northeast Campus have the lowest for each level. Thus, it can be concluded that the campus of enrollment affects student completion rates.

Day or Evening

The number of students enrolled in Mathematics 1403 was greater during the day, and the student completion rate was greater for day students. While it is true, in general, that day-student completion rates are higher than evening-student completion rates, it was found that five of the nine categories of students most likely to complete were evening students. See Student Characteristics below.

Instructor

While full-time instructors had higher student completion rates than did part-time instructors, the more noticeable difference in

rates is from instructor to instructor, showing a range of 50% with the low at 23% and the high at 73%.

Thus, it can be concluded that the individual instructor may affect the student completion rate. Further, it was found that the range for instructors on each campus varied, with the smallest range for Northwest Campus, the median range for South Campus, and the largest range for Northeast Campus.

Grades Being Made

The percentages of students withdrawing from Mathematics 1403 with an average of 80 or higher ranges from 6% to 21%, while those for students withdrawing with an average below 80 is 16% to 48%. Thus, it can be concluded that the grade (average) being made in the course is a factor affecting the student completion rates.

Very few students withdraw with an average less than 60, and yet students tended to withdraw after making their first grade below 70. Thus it can be concluded that students tend to withdraw when their average drops below 80 and specifically when an initial grade of less than 70 is made.

Week of Semester When Withdrawal Occurs

It was found that on each campus there are withdrawal peaks during specific weeks. These varied by mode of instruction. However, peaks occurred during the 14th week for Northeast and South Campuses and during the 13th week for Northwest Campus. This indicates that students who have fallen behind in the testing schedule or have a low average choose to withdraw and re-enroll at a later semester.

Content Being Studied at Time of Withdrawal

For each level on each campus there are peaks in withdrawal rates related to particular units of content. Thus it can be concluded that content being studied affects the student completion rate.

Student Characteristics

In level A on all three campuses the students most likely to complete the course had these characteristics in common:

* Older (over 30)
* Female
* Caucasian
* Continuing student with 15 to 31 hours completed
* One to two years of high school algebra
* Moderate amount of responsibility
* Expectation of making an A or, if on South Campus, at least a B
* Higher placement scores than the non-completers
* Less anxiety and more confidence than the non-completers

In level B on all three campuses the students most likely to complete the course had these characteristics in common:

* Older (over 25)
* Female
* Caucasian
* One or two years of high school algebra
* Expectation of making an A, or, if on South Campus,

Content Being Studied at Time of Withdrawal

For each level on each campus there are peaks in withdrawal rates related to particular units of content. Thus it can be concluded that content being studied affects the student completion rate.

Student Characteristics

In level A on all three campuses the students most likely to complete the course had these characteristics in common:

* Older (over 30)
* Female
* Caucasian
* Continuing student with 15 to 31 hours completed
* One to two years of high school algebra
* Moderate amount of responsibility
* Expectation of making an A or, if on South Campus, at least a B
* Higher placement scores than the non-completers
* Less anxiety and more confidence than the non-completers

In level B on all three campuses the students most likely to complete the course had these characteristics in common:

* Older (over 25)
* Female
* Caucasian
* One or two years of high school algebra
* Expectation of making an A, or, if on South Campus, at least a B

* There for personal improvement
* Higher placement score than the non-completers
* Less anxiety and more confidence than the non-completers

In Level C on all campuses the student most likely to complete had the following characteristics in common:

* Female
* Caucasian
* Expectation of making an A or, if on Northeast Campus, possibly a B
* Higher placement scores than non-completers
* Less anxiety and more confidence than the non-completers

It was found that for Level A and B the student who had one or two years of high school algebra was more likely to succeed.

For all levels it can be concluded that the following characteristics positively affect student completion rates:

* Female
* Caucasian
* Expectation of high grade
* Higher placement scores
* Less anxiety and more confidence

Likewise, certain student characteristics negatively affect student completion rates:

* Younger
* Male
* Minority
* Individual Admission, Readmission, or GED

* 15 or fewer hours completed
* No high school algebra
* Expectation of low grade
* Lower placement score
* More anxiety and less confidence

For level C, age disappears as a factor, and hours completed increases; the male and minority are still high risks as well as those expecting low grades, having low placement scores, and expressing more anxiety and less confidence.

RECOMMENDATIONS

After a review of the extensive data gathered for this study and subsequent discussions the committee, in consensus, submits thirteen recommendations.

1. It is recommended that a common syllabus be developed by the three mathematics departments, thus assuring that content per level is consistent from campus to campus and that texts, testing, and grading systems are comparable.
2. It is recommended that a common placement instrument be developed or selected for all campuses, with well-defined guidelines for usage and cut-off scores.
3. It is recommended that a policy be developed to include the following provisions:
   a. That each new student be encouraged to take the mathematics placement exam.
   b. That each student be required to take the mathematics placement exam or present documentation that prerequisites have been met prior to enrolling in his or her first mathematics course.
   c. That placement based on test scores be waived only after careful interview with the student by the department chairperson or designee.
   d. That a system be developed to continuously monitor the

effectiveness of the placement program and to adjust cut-off scores as required for the most efficient placement.

4. It is recommended that alternate modes of instruction be encouraged. In all modes the course content as described in the syllabus should be the same.
5. It is recommended that the support system for Mathematics 1403 be tailored to the needs of each campus so that all campuses will be equally effective in regard to facilities, materials, resources, and personnel.
6. It is recommended that efforts be made to choose part-time faculty well suited for teaching developmental mathematics. Each instructor should be properly oriented with both oral and written information about the course, the classroom expectations, and the lab function, role and procedure.
7. It is recommended that full-time faculty be specifically involved in strengthening the philosophy surrounding a positive and student-oriented program in Mathematics 1403.
8. It is recommended that all faculty members with consistently low student completion rates be identified and that possible reasons for their low SCR's be identified, with the aim of providing appropriate assistance.
9. It is recommended that the feasibility of developing appropriate test banks for Mathematics 1403 be considered, with the aim of improving test quality.
10. It is recommended that limiting class size be a priority and that maximums be established and not exceeded without appropriate approval.

11. It is recommended that a self-contained classroom be allocated for every section of Mathematics 1403.

12. It is recommended that the mathematics departments work with counseling departments to ensure adherence to Mathematics 1403 placement policy and that the two departments cooperate in assisting students in improving study skills and test-taking skills, anxiety reduction, goal setting, time management, and realistic expectations.

13. It is recommended that Computer Services work with the mathematics departments in defining computer needs and in recommending mini or micro systems to be purchased for each department. Department computers should interface with the district mainframe in order that class rosters, placement test results, and similar data be easily accessible to the mathematics departments. It is further recommended that programming services be provided or that suitable existing programs be purchased to perform complete and detailed class record managment, which would assist in developing strategies for positive reinforcement and assistance for the student.

AFTERWORD

One result of this evaluative study has been a renewal of the committee's awareness of the difficulties and demands of creating and carrying out a remedial mathematics program. It thus seems appropriate to commend instructors and administrators on all campuses of the Tarrant County Junior College for their years of dedicated effort in developing pre-college mathematics courses that have opened the way for many students to achievement at the college level.

Further, the committee recognizes the significance of developmental mathematics in the overall philosophy of instruction of the Tarrant County Junior College District. It also recognizes the possibility of improving this program through a well-designed and well-functioning system combined with excellent teaching.

Finally, the committee wishes to express confidence that if the recommendations for this study are followed, student completion rates can be improved throughout the district while maintaining and improving the quality of the mathematics program.

APPENDIX

(INDEXED BY CHAPTER)

APPENDIX I-1

COLLEGE CATALOGUE (1967) COURSE DESCRIPTIONS

1203. Developmental Mathematics I. Fundamental arithmetical processes related to operations with whole numbers, fractions, mixed numbers, decimals, ratio and proportion, percents, signed numbers, measurement and square root. Includes an introduction to algebra.

1213. Developmental Mathematics II. This course is designed to provide the transition from elementary algebra to college algebra. Includes a study of signed numbers, functions and their graphs, linear equations, factoring, exponents, radicals and quadratic equations. Prerequisite: Mathematics 1203 or equivalent.

1223. Geometry. Fundamentals of plane geometry with an introduction to coordinate and space geometry. Prerequisite: Mathematics 1203 or equivalent.

1303. Applied Algebra. Treatment of measured data. A review of algebra which covers linear equations, systems of linear equations. Also included is a comprehensive study of functions and graphs, exponents, radical, ratio, proportion, and variation. Prerequisite: Two units of high scnool mathematics including one unit of algebra.

APPENDIX I-2

COLLEGE CATALOGUE (1970) COURSE DESCRIPTIONS

1203. Developmental Mathematics I. Topics include sets and set operations, whole numbers, common fractions, decimal fractions, percent, squares and square roots, non-decimal modern systems of numeration, basic units of measure, informal geometry, ratio and proportion, and statistics.

1213. Developmental Mathematics II. Topics include sets; numbers of arithmetic; rational and irrational numbers; addition, subtraction, multiplication, and division of real numbers; order; polynomials; linear equations and linear inequalities; products and factors; fractions; linear functions and graphs; systems of linear equations and inequalities; exponents and radicals; and quadratic equations.

1223. Developmental Mathematics III. Topics include properties of real numbers; polynomials; fractions; exponents; roots; radicals; first-degree equations and inequalities in one variable; functions and graphs; systems of equations and inequalities; sequences and series; and exponential and logarithmic functions. Prerequisite: Mathematics 1213 or satisfactory score on a placement test.

APPENDIX II-1

Report of the Committee on Improving Remediation Efforts in the Colleges
Mathematical Association of America

July, 1980

(Approved by the Board of Governors on August 20, 1980)

It is well documented that large numbers of freshmen entering the colleges and universities of this country lack adequate preparation in mathematics. The 1975-76 Report of the Survey Committee of the Conference Board of the Mathematical Sciences showed 141,000 remedial enrollments at four-year institutions and 245,000 at two-year institutions in 1975. An informal survey of 20 large two-year public colleges and 25 large state-supported universities, made in 1979 by the Committee on Improving Remediation Efforts in the Colleges, showed that almost all institutions are providing beginning courses that include elementary algebra and often arithmetic. This response suggests that the 1980-81 Survey will indicate sharp increases in remedial enrollments since 1975, at least at the four-year institutions. Indeed, the February 1980-81 Survey will indicate sharp increases in remedial enrollments since 1975, at least at the four-year institutions. Indeed, the February 1980 Notices reports a 29% increase in course enrollments below calculus between fall 1978 and fall 1979 in the top 27 ACE ranked mathematics departments (Rung, Donald C., "Changes in Enrollments, Class Sizes, and Size of Faculty," Notices 27 (February, 1980), 176-177).

The Committee on Improving Remediation Efforts in the Colleges was formed in Autumn 1978 by the Executive Committee of the MAA in response to the 1978 PRIME 80 recommendations. The committee has four charges from the PRIME 80 recommendations:

1. to analyze the content of courses now being given for

remediation purposes, ascertain from the faculty teaching these courses the areas of difficulty, and prepare recommendations that would assist these teachers in helping students overcome their deficiencies

2. to address the problem of development of appropriate and motivating curricular materials, especially source materials on applications

3. to involve extensively two-year college faculty and other faculty teaching courses of this kind in the development of materials

4. to urge the Sections of the MAA to provide workshops at their sectional meetings on the problems arising from insufficient preparation of students.

First, a word about a word: the Committee has found that the word "remedial" is emotionally charged for many people and some colleagues would prefer that it not be used to describe instruction for underprepared students in mathematics. Furthermore, courses developed for these students have different (and sometimes almost nonintersecting) contents at different institutions. Nonetheless, the Committee has not found a less offensive phrase and in this report will use the word "remedial" to refer to (a) those freshmen students who are not prepared to begin the mathematics courses required in their degree programs and (b) mathematics courses designed to prepare those students for entrance into the regular required courses in degree programs.

Before writing this report, the Committee spent several months studying current programs at junior colleges, four-year colleges, and universities. We found no institution that has not been affected by the lack of preparation

of large numbers of students. There is predictably a great deal of diversity among the programs that have been developed, yet the Committee feels that it can identify some characteristics of successful programs; these will be listed in a later section.

For many years, the two-year institutions carried much of the burden of remedial instruction in mathematics. However, four or five years ago many four-year colleges and universities began to develop or expand remedial programs and, indeed, many other schools are now initiating new programs in response to at least two new pressures. First, many schools anticipate more vigorous recruitment of students and want to be sure that their curricula provide access to degree programs for all potential students. Second, some universities and many arts and sciences colleges have recently established or soon will establish a mathematics requirement for graduation, and mathematics departments are being charged to develop courses that will prepare students to meet this requirement. Thus, it appears that even more attention will be given to these matters by many departments in the next few years.

The Committee has found many institutions where faculty feel the remediation efforts are doing little good and, indeed, their data confirm this feeling. Teachers are frustrated by the low-level instruction and departments are hard pressed to absorb the costs of increased loads. On the other hand, in some schools the Committee has found considerable optimism. Individual faculty members report that they can realistically set higher goals for this audience than they first thought, that they have learned a great deal about the teaching of elementary mathematics from their involvement with remedial students, and that the development of remedial courses has sometimes resulted in the modification and improvement of other undergraduate courses. These individuals welcome the opportunity to teach good mathematics (albeit elementary) to

an audience who might otherwise have taken no mathematics in their college programs.

The Committee has found programs which teach the technical skills needed in later courses and at the same time provide for conceptual understanding and for analytic reasoning; data indicate that large numbers of students are moving successfully from these programs into the mathematics courses required in degree programs. Some schools are using the instruction of remedial students as part of their program for the training of teachers and are convinced that it is very important to involve future teachers with students who failed to learn pre-college mathematics.

In spite of the positive aspects of remedial efforts in some departments and the likelihood that the pressures to provide this instruction will not diminish for some time, the Committee feels strongly that the proper place for instruction at this level is in the secondary schools. The learning of elementary mathematics is best done over a period of several years. No highly concentrated program contained in a few months can substitute for the opportunity to deal with the ideas of elementary mathematics over an extended time. Several programs have been developed to encourage more adequate preparation in mathematics at the pre-college level. The National Council of Teachers of Mathematics and the MAA have made strong recommendations on college preparatory mathematics in the publication "Recommendations for the Preparation of High School Students for College Mathematics Courses." We shall cite other examples which we think are having significant effects and which indicate appropriate professional effort in solving this problem in the secondary schools.

Efforts with Pre-College Students

The MAA publication, The Math in High School You'll Need for College, has been widely circulated to guidance counselors and students in the schools. More than 320,000 copies have been requested from the national headquarters, a record for MAA publications. A few colleges and universities have prepared careful statements to secondary schools in their states describing the mathematics requirements in programs at their institutions and what constitutes appropriate secondary preparation for the required mathematics. One college has developed a review workbook in algebra and trigonometry which students can obtain at the time they are admitted and work on over the summer months before writing the mathematics placement test in the autumn.

One large midwestern state university is using equivalent forms of its placement exam to test high school students in their junior year and to make recommendations on senior math courses that, if successfully completed, will correct deficiencies before students come to the university. Early results from this project are promising.

The project Women and Mathematics (WAM) and Blacks and Mathematics (BAM), which place visiting lecturers in the schools to talk about the importance of early preparation in mathematics, have data showing significant increases in enrollment in college-preparatory courses in the schools that have been involved in their programs. Indeed the full program of the MAA's Committee on Secondary School Lectures is an important part of the profession's effort to influence the preparation of students in the schools.

The Committee has been impressed by mathematics courses developed in some departments for both elementary and secondary inservice teachers. There is evidence that teachers respond to opportunities to study more mathematics and

that these offerings need to be expanded. The discontinuation of the NSF institutes of the 60's has left secondary teachers with too little opportunity for the continued study of mathematics. A few departments are using undergraduate education majors as tutors in their remedial courses and regard this activity as an important part of their training. Usually the undergraduates are simultaneously enrolled in teaching seminars.

Characteristics of Effective Remedial Programs

Among the remedial programs which the Committee studied, there is a considerable diversity in goals, course content, instructional format, and cost. However, the Committee has identified certain characteristics that contribute to successful programs and hopes that summarizing these will be helpful to departments that are attempting to improve these efforts. The most successful programs share these characteristics:

-- Involvement of regular faculty in the direction of the program and in the instruction
-- Institutional and departmental commitment to the program, shown both through reasonable financial support and through appropriate rewards for faculty involved
-- Requirement of strong commitment of time and effort on the part of students, with attempts to communicate to students the scope and demands of the programs
-- Program of study tightly structured, with the individual's pace determined by the instructor (not the student) in response to the student's ability and progress
-- Use of curricular materials often developed (or at least synthesized) by faculty in the program

-- Strong emphasis on problem solving, perhaps with calculators, and on involving students with demanding problems at an elementary level; a de-emphasis on vocabulary

-- Content which both responds to real world experiences and provides interesting elementary applications, and at the same time strives for conceptual understanding

-- Integration of mathematical ideas both horizontally (e.g., analytic geometry, algebra) and vertically (e.g., awareness that processes are repeated in different settings)

-- Effort to achieve some specific short range objectives (e.,g., computational skills with rational expressions) and also to get started on some longer range goals (e.g., understanding the notion of function)

-- Awareness of the needs of different groups of students in the remedial audience (e.g., 18 year olds vs. returning adults, untaught student vs. unsuccessful students, anxious students vs. lazy students) and instructional strategies that provide for these differences

-- Emphasis on an informal instructional atmosphere that provides considerable moral support to the students and encourages peer interaction in the learning of mathematics

-- Enthusiasm among teachers and strong respect for the potential of the students

-- Ratio of students to teachers not greater than 30:1 in courses that include topics in arithmetic and elementary algebra

-- Provision for interaction between teacher and individual students

-- Careful attention to the training and supervision of inexperienced teachers

Answers to Some Particular Questions

The following questions have frequently been raised with the Committee:

Q 1. Are any schools successfully using computers for remedial instruction?

A 1. There are schools that are making good use of computers for course management and record keeping. However, we do not have an example where computers are being successfully used on a large scale to teach these courses designed to prepare students for college-level mathematics. At least one pilot project is underway, but materials and performance data are not yet available.

Q 2. Are there examples where large lecture is effective at the remedial level?

A 2. We know of several schools that have tried large lectures in their courses below the calculus, usually in combination with small tutorial sessions. Many have abandoned this format. We have not had any faculty defend its effectiveness at this level.

Q 3. What ways have departments found to reduce the cost of remedial instruction?

A 3. Wide differences in student backgrounds plus the common apprehension of students toward the learning of mathematics make remedial instruction costly. Done well, it requires the involvement of some experienced teachers and some small group instruction. Universities are commonly using teaching associates and undergraduate aids. Some colleges are using undergraduates as tutors, in particular, undergraduates who have successfully completed the remedial program. When these inexperienced teachers are carefully trained and are supervised by, and sometimes teamed with, faculty, there is evidence the results can be good. Some schools charge student extra fees to provide costly remedial courses.

Q 4. What are colleges doing about credit for these pre-college level courses?

A 4. There are colleges where remedial courses carry regular credit and there are colleges where remedial courses are non-credit. More common, however, is an arrangement where remedial courses provide credit but that credit is not applicable to degree requirements or at least to distribution requirements. This arrangement means that grades in remedial courses are part of the student's grade point average and that a remedial course is part of the student's total course load; in some state schools, it also qualifies remedial courses for state subsidy.

The Board of Governors of the MAA issued a statement on college credit for high school level mathematics at its meeting on August 20, 1979, which says in part:

"...Mathematics courses offered in college should be examined to determine the extent of their overlap with high school mathematics, and where that overlap is substantial, the course should not provide credit toward college graduation; but the students should be graded on their work, and the results should be included in computing grade point averages."

Q 5. What are the best curricular materials for the remedial level?

A 5. A few years ago most materials on the market for college remedial courses looked like accelerated school texts. Faculty at several schools, judging the available materials unsatisfactory, have been developing their own materials. Some of these are beginning to appear commercially and could be more appropriate for the instruction of college students. Diagnostic instruments to identify specific weaknesses of individual students are also under development. It may, however, be characteristic of good instruction at this level that

instructors continue to write at least part of their own materials. In recent years, attention in the departments have been focused largely on beginning level courses for under-prepared 18-year olds. There appears to be increasing awareness of the needs of adult, returning students who also need elementary mathematics but whose experiences are very different from those of traditional freshmen. We expect some materials for this audience to become available.

Q 6. How can we find out what other schools are doing with remedial instruction?

A 6. Many frustrated people have asked this question. There has not been an effective mechanism for the broad exchange of information among people working with instruction at this level. People starting new programs frequently feel they are re-inventing the wheel. People who feel they have something to say are unsure where to say it. The Committee feels that high priority for the Association needs to be providing for the exchange of information among people working with remedial instruction. Some section meetings this year did include remedial instruction as part of their programs.

The Committee is preparing a packet of information which will contain summaries of the best efforts at representative institutions (both instructional programs and programs in the schools) together with the names of people who can provide detailed information about these programs. This packet will be available from the MAA Headquarters for Section leaders and individuals responsible for starting new programs or improving old ones. It should be mentioned that a reasonably well-developed network does exist for persons interested in working with the math-anxious. Those who want more information may refer directly to

Appendix II and the Resources section of Sheila Tobias' book, Overcoming Math Anxiety. Other networks have also been called to the attention of the Committee and we will attempt to index them in the information packet.

Recommendations to MAA

The Committee on Improving Remediation Efforts feels that the Association must recognize remedial instruction as an important responsibility of the mathematics community and must provide leadership to departments in seeing that this instruction is of the highest quality.

More specifically, the Committee recommends:

1. That the Association circulate this report to its members, in particular to department chairpersons, urging departments to provide appropriate instruction for students who are not prepared for college-level mathematics and adequate rewards to faculty for leadership in this instruction.

2. That the Association urge colleges and universities to develop ways of communicating to the schools the mathematics requirements of their institution, that they make clear to students in the schools what mathematics preparation is necessary for students to enter adequately prepared, that where appropriate they provide courses in mathematics for in-service teachers.

3. That the Association provide in the program of national meetings for the exchange of ideas among teachers at the remedial level through swap sessions, panels, and workshops, and that Section leaders be encouraged to include various aspects of remedial instruction in their meetings.

4. That publications of the Association be used regularly to communicate information about the content and pedagogy of remedial programs in several

institutions and about the results of some programs with secondary students.

5. That remedial curricula become a specific responsibility of the Committee on the Undergraduate Program in Mathematics and that CUPM, working closely with the Committee on Two-Year Colleges, give continued attention to this level of instruction.

Many people have consulted with the Committee and have provided course materials and performance data. The Committee is greatly indebted to them and wishes to thank particularly the following colleagues who attended the San Antonio meetings for the purpose of talking with the Committee.

James H. Johnson, Norfolk State University

Frederick W. Keene, California State College

Jerrold Kleinsten, SUNY at Stony Brook

J. Michael Shaughnessy, Oregon State University

Charles N. Walter, Brigham Young University

Barbara Yanosko, Humbolt State College

Report prepared by the Committee on Improving Remediation Efforts in the Colleges

Robert Bumcrot
Philip M. Cheifetz
Ronald M. Davis
Donald M. Hill
Eleanor G. Jones
Joan P. Leitzel, Chairperson
Jean J. Pederson

APPENDIX II-2

TARRANT COUNTY JUNIOR COLLEGE DISTRICT
1400 THE ELECTRIC SERVICE BUILDING
FORT WORTH, TEXAS 76102
TEL. 817/335-7851

March 9, 1983

RECEIVED
MAR 21 1983
OFFICE OF RESEARCH
T.C.J.C.D.

Dr. John Losak
Miami-Dade Community College
11011 S. W. 104 Street
Miami, FL 33176

Dear John

Tarrant County Junior College has problems with development-level Math courses. We have very large enrollments and very high withdrawal rates--ranging from 40-60 percent. Can you provide us some data for your District/or for each campus within the District? Anything you can provide will be sincerely appreciated!

Here's our data (in a format we'd like to see yours) for Fall 81-82:

	District	South	NEast	NWest
Total Number of Students Enrolled in College	21442	8843	8937	3642
Number of Students Enrolled in 1403A Arithmetic	1069	758	101	210
Number earning A, B, C, or D (passing)	621	438	59	124
Number earning F or W (not passing)	448 42	320 42	42 42	86 41.
Number of Students Enrolled in 1403B Ele. Albegra	1216	538	362	316
Number earning A, B, C, or D (passing)	591	270	134	187
Number earning F or W (not passing)	625 51	268 50	228 63	129 41
Number of Students Enrolled in 1403C Int. Algebra	567	207	263	97
Number earning A, B, C, or D (passing)	317	119	144	54
Number earning F or W (not passing)	250 44	88 43	119 45	43 44

I've "penciled" in what I believe to be comparable courses for your institution on the form on the attached page.

Your help will be appreciated--and I promise to try to return the "in-kind" favor for you.

Horace Griffitts
Director of Research

plc

Enclosure

I have enclosed Two recent reports which summarize pass rates in our developmental/remedial classes — hope they are of help. Love to John

COLLEGE: Coast Community College District
DATA DATE: Fall 1981

COURSE MOST EQUIVALENT TO MTH 1403a: Math 005
COURSE TITLE: Applied Arithmetic
CATALOG DESCRIPTION: 2.0 UNITS. Arithmetic of whole numbers,fractions,decimals,simple algebra, percent, graphs and measurements. Credit/no credit grade.
GRADE DISTRIBUTION:

	A,B,C,D(passing)	F or W(not passing)
#	291	334
%	47	53

ANOTHER COURSE SIMILAR TO MTH 1403a: Math 008
COURSE TITLE: Pre-Algebra
CATALOG DESCRIPTION: Prerequisite: Competence in Arithmetic. A review of the fundamental operations with Integers and Fractions with applications to verbal probnlems. Offered on a credit-no credit basis only. Three hours.
GRADE DISTRIBUTION:

	A,B,C,D(passing)	F or W(not passing)
#	148	89
%	62	38

COURSE MOST EQUIVALENT TO MTH 1403b: Math 010
COURSE TITLE: Elementary Algebra
CATALOG DESCRIPTION: 3.0 Units. Prerequisite: Competence in basic arithmetic. Algebraic operations including first-degree equations, special products and factoring, ratio, radicals,quadratic equations. Credit/no credit grade.
GRADE DISTRIBUTION:

	A,B,C,D(Passig)	F or W(not passing)
#	475	496
%	49	51

COURSE MOST EQUIVALENT TO MTH 1403c: Math 110
COURSE TITLE: Intermediate Algebra
CATALOG DESCRIPTION: 3.0 units. Prerequisite: Compentency in elementary algebra. Review of elemantary algebra, linear and quadratic equations, curve plotting, exponents, radicals, logarithms, progressions, binomial theorem, variation, permutations, combinations, systems of equations, determinants, with applications.
GRADE DISTRIBUTION:

	A,B,C,D(Passing)	F or W(not passing)
#	870	715
%	55	45

Preliminary Report: June 20, 1983

SUMMARY:

	A,B,C,D(Passing)	F or W(not passing)
#	1,734	1,634
%	52	48

COLLEGE: Macomb County Community College
DATA DATE: Unknown

COURSE MOST EQUIVALENT TO MTH 1403a: MTH 005
COURSE TITLE: Modern Fundamental Math
CATALOG DESCRIPTION: Prerequisite: none. A math course centered around the fundamentals of arithmetic. The primary areas of concentration are addition, subtraction, multiplication, division, fractions, decimals, and percentages. (Three contact hours)
GRADE DISTRIBUTION:

	A,B,C,D(passing)	F or W(not passing)
#	180	80
%	69	31

COURSE MOST EQUIVALENT TO MTH 1403B: MTH 007
COURSE TITLE: Beginning Algebra
CATALOG DESCRIPTION: Prerequisite: none. A course in beginning algebra dealing with an introduction to sets and the real numbers, variables, variable expressions and their simplification, exponents, factoring rational expressions, equations.
GRADE DISTRIBUTION:

	A,B,C,D(passing)	F or W(not passing)
#	792	477
%	62	38

COURSE MOST EQUIVALENT TO MTH 1403c: MTH 100
COURSE TITLE: Intermediate Algebra
CATALOG DESCRIPTION: Prerequisite: MTH 007 or one year of high school algebra. Review of operations with algebraic expressions. Exponents and radicals, linear equations and inequalities, complex numbers, logarithms.
GRADE DISTRIBUTION:

	A,B,C,D(passing)	F or W(not passing)
#	876	383
%	70	30

SUMMARY:

	A,B,C,D(passing)	F or W(not passing)
#	1,848	940
%	66	34

Note: The the not passing grades shown above for Macomb County Community College do not include imcompletes. This tends to exaggerate the completion rates shown and make them not comparable to data that does include incompletes.

COLLEGE: Miami-Dade Community College
DATA DATE: Fall 1981

No data was received from Miami_Dade except for the equivalent of our MTH 1403b.
COURSE MOST EQUIVALENT TO MTH 1403b: MAT 1024
COURSE TITLE: Introductory Algebra
CATALOG DESCRIPTION: 3 credits. Elementary beginning algebra recommended for those students pursuing a mathematics oriented program and do not have two years of high school algebra.
GRADE DISTRIBUTION:

	A,B,C,D(passing)	F or W(not passing)
#	1,402	1,260
%	53	47

COLLEGE: Pima Community College
DATA DATE: Fall 1981

COURSE MOST EQUIVALENT TO MTH 1403a: MTH 060
COURSE TITLE: Introductory Mathematics
CATALOG DESCRIPTION: 3 cr. hrs./ 3 periods/ 3 lec. Mathematics 060A through 060C collectively comprise MTH 060.
MTH 060A: Topics include operations with whole numbers,place value,order of operations divisibility, prime factorization, and least common multiple.
MTH 060B: Topics include operations with common and decimal fractions.
MTH 060C: Topics include percent, ratio and proportion, measures, metric system and applications and signed numbers.
GRADE DISTRIBUTION:

	A,B,C,D(Passing)	F or W(not passing)
#	636	521
%	55	45

Preliminary Report: June 20, 1983

COURSE MOST EQUIVALENT TO MTH 1403b: MTH 070
COURSE TITLE: Algebra I
CATALOG DESCRIPTION: Prerequisite MTH 060 or equivalent. Mathematics 070A through 070C collectively comprise MTH 070.
MTH 070A: Topics include signed numbers, order of operations, inverse operations, linear equations and polynomials.
MTH 070B: Topics include factoring, rational expressions, and graphing linear equations and inequalities.
MTH 070C: Topics include systems of linear equations, roots, radicals, and quadratic equations.
GRADE DISTRIBUTION:

	A,B,C,D(Passing)	F or W(not passing)
#	719	744
%	49	51

COURSE MOST EQUIVALENT TO MTH 1403c: MTH 130
COURSE TITLE: Algebra II
CATALOG DESCRIPTION: Prerequisite MTH 070 or equivalent. Mathematics 130A through 130C collectively comprise MTH 130.
MTH 130A: Topics include real numbers properties, linear equations, and systems of linear equations.
MTH 130 B: Topics include products, factoring, algebraic fractions, fractional equations, exponents and radicals and complex numbers.
MTH 130 C: Topics include quadratic equations, functions and graphs, variation, exponential and logarithmic functions, inequalities and sets.
GRADE DISTRIBUTION:

	A,B,C,D(passing)	F or W(not passing)
#	530	485
%	52	48

SUMMARY:

	A,B,C,D(passing)	F or W(not passing)
#	1,885	1,750
%	52	48

NOTE: The passing grades shown above for Pima Community College include passing grades given by examination. This tends to exaggerate the completion rates shown and make them not comparable to data that did not include credit by examination.

State Board of Education
Essential Elements and Descriptors

PRE-ALGEBRA

PRE-ALGEBRA* shall include the following essential elements:	Descriptors:
1. Concepts and skills associated with understanding of number and the place-value system	1. Finding whole number and decimal place values 2. Using scientific notation 3. Finding factors and multiples 4. Understanding fraction concepts involving: . least common multiple . greatest common factor 5. Using integers
2. Operations on numbers, their properties, and their uses	1. Understanding basic operations with integers, decimals, fractions 2. Using the order of operations 3. Using exponents 4. Finding squares and square roots 5. Solving simple equations involving integers, decimals, and fractions 6. Applying skills
3. Experience in solving problems by selecting and matching strategies to given situations	1. Evaluating variables and expressions (formulas) 2. Using ratio and proportion 3. Finding percent 4. Determining needs related to personal finance
4. Investigation of the properties and relationships of geometric figures using measurement concepts and skills	1. Understanding the basic elements of geometry (point, line, etc.) 2. Investigating geometric figures and their characteristics 3. Using metric and customary units 4. Finding distance, perimeter, circumference, area, surface area, volume 5. Using indirect measurement with similar triangles 6. Investigating right triangle properties

PRE-ALGEBRA, continued

5. The use of probability and statistics to collect and interpret data	1. Using counting procedures (tree diagrams, multiplication) 2. Finding the probability of independent and dependent events 3. Gathering and recording data 4. Determining the mean, median, mode 5. Constructing graphs from gathered data 6. Interpreting graphs and analyzing data
6. Concepts and skills involved in the analysis and graphing of relations and functions	1. Graphing equations and inequalities 2. Constructing number lines 3. Using ordered pairs and coordinate graphing 4. Investigating linear equations and inequalities and their graphs 5. Applying direct and inverse variation 6. Finding slope and intercepts 7. Solving systems of equations 8. Applying skills

State Board of Education

Essential Elements and Descriptors

ALGEBRA I

FOR DISCUSSION ONLY APRIL 1983

ALGEBRA I shall include the following essential elements:	Descriptors:
1. Concepts and skills involving operations with real numbers and properties of real numbers	1. Classifying real numbers as integral, rational, or irrational 2. Graphing real numbers 3. Using the order of operations including adding, subtracting, multiplying, and dividing 4. Finding absolute value, exponents, additive and multiplicative inverses 5. Using equality and inequality
2. Linear equations and inequalities in one variable	1. Solving linear equations 2. Solving linear inequalities 3. Graphing equations and inequalities 4. Solving equations and inequalities involving absolute value 5. Using equations and inequalities in applications and problem-solving situations 6. Using formulas to solve problems
3. Linear equations and inequalities in two variables	1. Solving equations and formulas in two variables 2. Finding intercepts and slope to graph equations 3. Finding the equation of a line 4. Using the addition, subtraction, and substitution method of solving a system of equations 5. Using equations and inequalities in applications and problem-solving situations
4. Concepts and skills associated with polynomials	1. Adding, subtracting, multiplying, and dividing polynomials 2. Factoring polynomials

ALGEBRA I, continued

5. Concepts and skills associated with rational expressions	1. Simplifying rational expressions 2. Solving problems using ratio and proportion 3. Multiplying, dividing, adding, and subtracting rational expressions
6. Properties of roots and operations with radicals	1. Finding square roots 2. Multiplying, dividing, adding, subtracting, and simplifying square roots 3. Simplifying radicals 4. Solving simple radical equations
7. Concepts and skills associated with quadratic equations	1. Graphing quadratic equations 2. Solving quadratic equations by using square roots, graphing, factoring, completing the square, the quadratic formula 3. Applying quadratic equations

State Board of Education

Essential Elements and Descriptors

ALGEBRA II

ALGEBRA II shall include the following essential elements:	Descriptors:
1. Concepts and skills associated with open sentences	1. Solving open sentences in one variable 2. Solving systems of linear open sentences
2. Properties of relations and functions	1. Investigating relations and their graphs 2. Finding inverse relations 3. Investigating properties of functions 4. Finding the domain and range of a function 5. Performing operations on functions 6. Using special functions 7. Using direct and inverse variation
3. Properties of the complex number system	1. Defining a complex number, its additive inverse, conjugate, and absolute value 2. Adding, subtracting, and multiplying complex numbers
4. Concepts and skills associated with polynomials and rational expressions	1. Factoring expressions over the set of complex numbers 2. Simplifying rational expressions 3. Performing operations (+, −, ×, ÷) involving rational expressions 4. Simplifying complex fractions
5. Properties of points and planes in space	1. Using coordinate geometry 2. Investigating vectors--length, scalar multiples, sum, and difference 3. Finding the distance between points in a plane and finding the midpoints of segments 4. Solving systems of equations using linear combinations

ALGEBRA II, continued

6. Concepts and skills associated with matrices and determinants	1. Adding multiplying matrices 2. Solving systems of equations using determinants or matrices 3. Using determinants to solve problem situations
7. Concepts and skills associated with quadratic functions	1. Developing and using the quadratic formula 2. Finding discriminants and zeros of quadratic functions 3. Writing quadratic equations from roots 4. Graphing, using constants, finding the vertex and axis of symmetry, and estimating zeros
8. Concepts and skills relating to conic sections and systems of quadratics	1. Graphing equations of circles, ellipses, parabolas, and hyperbolas 2. Writing the equation of a parabola and a circle from the locus definitions 3. Identifying conic equations 4. Graphing quadratic systems and indicating solution sets 5. Solving systems algebraically
9. Concepts and skills relating to exponential and logarithmic functions	1. Graphing functions and inverses 2. Changing equations from logarithmic to exponential form and conversely 3. Using logarithms to solve problems 4. Solving logarithmic and exponential equations
10. Concepts and skills relating to higher degree polynomial functions	1. Using synthetic division 2. Applying the Fundamental Theorem of Algebra 3. Using the Rational Root Theorem 4. Applying Descartes' Rule of Signs and the Upper and Lower Bound Theorem 5. Graphing polynomial functions

ALGEBRA II, continued

FOR DISCUSSION ONLY
APRIL 1983

11. Concepts and properties of sequences and series	1. Investigating arithmetic and geometric sequences 2. Finding arithmetic and geometric means 3. Investigating arithmetic and geometric series 4. Investigating convergent geometric series 5. Using sequences and series as models of problem situations 6. Using factorials 7. Expanding binomial powers 8. Using the Binomial Theorem

APPENDIX III-1

MATHEMATICS 1403 TEXTS FOR ALL TCJC CAMPUSES

1982-83

Level	Text	Author	Campus	Mode
A	Arithmetic	Miller and Salzman	NE	P
A	Arithmetic	Preis and Cocks	NW S	P P&L
B	Elementary Algebra	Groza	NE	P&L
B	Algebra Programmed (1&2)	Alwin and Hackworth	NW S	P P
B	Beginning Algebra	Munem and Tschirhart	S	L
C	Intermediate Algebra	Groza and Sellers	NE	P&L
C	Algebra Programmed (3)	Alwin and Hackworth	NW S	P P
C	Intermediate Algebra	Munem and Tschirhart	S	L

APPENDIX III-2

TOPICS INCLUDED IN MATHEMATICS 1403A ON ALL CAMPUSES

Whole Numbers
- Reading and Writing
- Place Value
- Rounding
- Addition
- Subtraction
- Multiplication
- Division
- Primes and Composites
- GCD and LCM

Fractions
- Equivalence of fractions
- Fractions and Mixed Numbers
- Addition
- Subtraction
- Multiplication
- Division

Decimals
- Reading and Writing
- Place Value
- Rounding
- Addition
- Subtraction
- Multiplication
- Division
- Fractions to Decimals & V.V.

Percent
- Fractions & Decimals to % and V.V.
- Finding a per cent of a number
- Finding what percent one number is of another
- Finding a number when a percent is known

Ratio and Proportion

Integers
- Number line
- Addition
- Subtraction
- Multiplication
- Division

Rational Numbers
- Equivalence, changes of form
- Addition
- Subtraction
- Multiplication
- Division

Percentage of Course Content:

South 100% Northwest 87.5% Northeast 72%

Topics included on Northeast and Northwest but not on South:

Measurement
- Accuracy and Precision
- English System
- Metric System
- Conversion of Units

Percentage of Course Content:

Northwest 12.5% Northeast 12%

Topics included on Northeast only:

Geometry
- Rectangles and Squares
- Parallelograms and Trapezoids
- Triangles, Circles
- Volumes

Algebra
- Evaluating Expressions and Formulas
- Solving Equations

Percentage of Course Content: Northeast 16%

APPENDIX III-3

TOPICS INCLUDED IN MATHEMATICS 1403B ON ALL CAMPUSES

The Real Number System
- Classification of numbers as integral, rational, real.

Exponents, Roots, and Radicals
- Zero, Negative, Rational Exponents
- Operations on Radical Expressions

Polynomials
- Basic Operations on Polynomials
- Factorization
  - Grouping
  - Higher Degree Polynomials

Rational Algebraic Expressions
- Simplification
- Addition and Subtraction
- Multiplication and Division
- Complex Fractions

Equations and Inequalities
- Linear Equations and Inequalities
- Absolute value equations and inequalities
- Quadratic Equations

Functions and Graphs
- Basic Definitions and Notation
- Linear Functions, Slope, Intercepts
- Equations of Lines satisfying given conditions

Systems of Equations
- Linear Systems of two and three unknowns

Stated Problems

Complex Numbers
- Operations on Complex Numbers
- Definition of Complex Numbers

Percentage of Course Content:
Northeast 80% Northwest 80% South 90%

Topics Included by Northeast and Northwest but not by South:
- Logarithms

Percentage or Course Content:
Northeast 10% Northwest 10%

Topics Included by Northwest and South but not by Northeast:
- Field Properties
- Equations of Circles
- Graphs on non-linear functions

Percentage of Course Content:
Northwest 10% South 10%

Topics Included by Northeast, not by South and Northwest:
- Determinants and matrices of order 2-3
- Analysis of roots of quadratic equations
- Quadratic equations with given roots
- Quadratic inequalities
- Graphs of relations
- Equations involving radicals

Percentage of Course Content: Northeast 10%

APPENDIX III-4

TOPICS INCLUDED IN MATHEMATICS 1403C ON ALL CAMPUSES

Brief Introduction to Set Terminology and Notation
Operations on Integers
Operations on Rational Numbers
Introduction to Algebraic Expressions
Polynomials
- Addition and Subtraction
- Multiplication
- Division
- Factoring

Algebraic Fractions
- Simplification
- Multiplication
- Addition and Subtraction

Linear Equations and Stated Problems
Fractional Equations
Graphs of Straight Lines
Solutions of systems of 2 linear equations in two unknowns
Radicals
- Simplification of square roots
- Multiplication
- Division
- Addition

Quadratic Equations

Percentage of Course Content:
South 100% Northwest 100% Northeast 95%

Topics included on Northeast but not on Northwest or South:

Properties of Equality
Slopes of lines, Slope Int. Form, Parallel lines

Percentage of Course Content:
Northeast 5%

Further: Significantly greater emphasis on stated problems on Northeast.

APPENDIX III-5

PLACEMENT IN MATHEMATICS 1403

South Campus: One test of 25 questions is administered. The first 12 questions are over material of 1403 A; the last 13 are over 1403 B material.

0-8 on 1st 12:	1403 A
9-12 on 1st 12; 0-8 on 2nd 13:	1403 B
9-12 on 1st 12; 9-13 on 2nd 13:	1403 C or higher

Northwest Campus: A test is administered in two parts. Part 1 consists of 21 questions over material of 1403 A; if a minimum of 15 correct on Part 1, Part 2 is administered, consisting of 15 questions over 1403 B material.

0-14 on Part 1:	1403 A
15-21 on Part 1 and 0-8 on Part 2:	1403 B
15-21 on Part 1 and 9-11 on Part 2:	1403 C or higher

Northeast Campus: Four tests from Descriptive Tests of Mathematics Skills of the College Board are used in mathematics placement. Two of these determine placement within 1403.

Arithmetic Skills:	Minimum of 28 out of 35 for placement in 1403 B
Elem. Algebra Skills:	Minimum of 22 out of 35 for placement in 1403 C

A score of 18 or above on Intermediate Algebra Skills is the minimum for placement in College Algebra 1603 or 1633, and placement in higher courses requires a test on Functions and Graphs.

APPENDIX III-6
SOUTH CAMPUS

MATHEMATICS 1403 PLACEMENT TEST

1. The digit occupying the ten-thousands place in 129,304 is

   a) 1 b) 3 c) 2 d) 9

2. 61.0081 - 8.735 =

   a) 48.254 b) 52.2731 c) 60.1256 d) 61.8816

3. The product of the following is: (27.05)(40.8) =

   a) 1103.64 b) 9036.05 c) 1056.040 d) 1123.640

4. $\frac{12}{13} \div \frac{4}{5}$ =

   a) $\frac{48}{65}$ b) $\frac{15}{13}$ c) $\frac{3}{2}$ d) $\frac{52}{60}$

5. $\frac{7}{8} + \frac{2}{3}$ =

   a) $\frac{9}{24}$ b) $\frac{9}{11}$ c) $\frac{37}{24}$ d) $\frac{14}{24}$

6. The decimal equivalent for the fraction $\frac{9}{16}$ is:

   a) 1.677 b) 9.16 c) .5625 d) .510

7. 38% of 350 is:

   a) 9 b) 9.24 c) 133 d) 13300

8. 64 is ____% of 80.

   a) 80 b) 1.215 c) .8 d) 121

9. 4 + ⁻6 =

   a) 10 b) ⁻10 c) 2 d) ⁻2

10. ⁻4 · 6 =

    a) 2 b) 24 c) ⁻10 d) ⁻24

11. $3\frac{1}{5} - 1\frac{1}{2}$ =

    a) $2\frac{3}{10}$ b) $1\frac{7}{10}$ c) $1\frac{1}{3}$ d) $\frac{13}{3}$

12. $1\frac{3}{4} \cdot 2\frac{1}{3}$ =

    a) $2\frac{1}{4}$ b) $\frac{21}{28}$ c) $4\frac{1}{12}$ d) $2\frac{3}{12}$

13. If x = ⁻2 and y = 5, the value of 12 - 4x + 3y - 2xy is :

    a) ⁻1 b) 55 c) 930 d) 0

14. Simplify: 3(2x - 4) - 6

    a) x - 12 b) 6x - 18 c) x - 4 d) 6x - 10

15. Solve for x: 4x + 7 = 2x - 11

    a) 3 b) 9 c) ⁻9 d) ⁻18

16. (x + 4)(x - 6) =

    a) $x^2 - 2x - 24$ b) $x^2 - 24$ c) 2x - 2 d) $x^2 - 10x - 24$

17. Factor: $x^2 + 3x - 10$

a) $(x - 4)(x - 6)$ b) $(x - 5)(x + 2)$ c) $(x + 5)(x - 2)$ d) $x(x + 3) - 10$

18. Simplify: $\dfrac{x^2 + 5x - 24}{x^2 + 10x + 16}$

a) $\dfrac{(x - 8)}{(x - 8)}\dfrac{(x + 3)}{(x + 2)}$ b) $\dfrac{x - 3}{x + 2}$ c) $\dfrac{-3}{2}$ d) $\dfrac{-19}{26}$

19. $\dfrac{x^2 - 5x}{x^2 + 3x + 2} \cdot \dfrac{x^2 + 7x + 10}{x^2 - 25}$ =

a) $\dfrac{2x + 10}{3x - 22}$ b) $\dfrac{9x}{5}$ c) $\dfrac{x}{x+1}$ d) $\dfrac{-32}{-25}$

20. $\dfrac{x - 9}{x - 2} - \dfrac{x + 4}{x - 3}$ =

a) $\dfrac{-13}{-5}$ b) $\dfrac{-10x - 5}{(x - 2)(x - 3)}$ c) $\dfrac{-14x + 35}{x^2 - 5x + 6}$ d) -5

21. $x + 2 \overline{)\,x^2 + 5x + 3}$ =

a) $x + \dfrac{5x}{2} + \dfrac{3}{2}$ b) $x + 3 - \dfrac{3}{x+2}$ c) $x + 8$ d) 4

22. Solve for x: $\dfrac{2}{5} - \dfrac{1}{x} = \dfrac{3}{5x}$

a) $\{0\}$ b) $\{4\}$ c) $\{-1\}$ d) $\left\{\dfrac{3}{5x}\right\}$

23. Solve for x: $x^2 - 7x + 10 = 0$

a) $\{-2\}$ b) $\{4\}$ c) $\{2,5\}$ d) $\{-2,-5\}$

24. Simplify: $4\sqrt{12} + \sqrt{27}$

a) 53 b) 17 c) $11\sqrt{3}$ d) $5\sqrt{39}$

25. Solve for K: $-\frac{1}{2}K < 4$

a) $K < 2$ b) $K < -8$ c) $K > -8$ d) $K < 8$

APPENDIX III-7
NORTHWEST CAMPUS

MATHEMATICS PLACEMENT TEST (PART 1)

TEST NUMBER: F-1 DO NOT WRITE ON THIS TEST !!!!

INSTRUCTIONS:
1. Fill in name, date, and test number on computer answer sheet.
2. Use scratch paper provided by lab instructor.
3. Turn in test, answer sheet, and scratch paper.

1. 32+81+67= a) 161 b) 170 c) 171 d) 180 e) 181

2. 328 − 163 a) 155 b) 165 c) 245 d) 255 e) 265

3. 673 × 45 a) 718 b) 6057 c) 29285 d) 30285 e) 31785

4. 1305 ÷ 15 a) 81 b) 85 c) 87 d) 810 e) 870

5. $\frac{1}{3} + \frac{3}{5}$ = a) $\frac{4}{8}$ b) $\frac{14}{8}$ c) $\frac{4}{15}$ d) $\frac{8}{15}$ e) $\frac{14}{15}$

6. $\frac{2}{5} \times \frac{3}{7}$ = a) $\frac{5}{12}$ b) $\frac{14}{15}$ c) $\frac{5}{35}$ d) $\frac{6}{35}$ e) $\frac{29}{35}$

7. $\frac{2}{5} + \frac{7}{8}$ = a) $\frac{7}{20}$ b) $\frac{16}{35}$ c) $\frac{54}{35}$ d) $\frac{14}{40}$ e) $\frac{41}{40}$

8. $\frac{3}{5} - \frac{1}{3}$ = a) $\frac{2}{2}$ b) $\frac{4}{2}$ c) $\frac{2}{8}$ d) $\frac{2}{15}$ e) $\frac{4}{15}$

9. 83.37 + 36.8 = a) 8.705 b) 11.917 c) 120.17 d) 87.05 e) 119.17

10. 61.0081 − 8.735 = a) 52.2631 b) 52.2731 c) 60.1346 d) 522.631 e) 601.346

11. 27.05 × 40.8 a) 110.36 b) 110.364 c) 129.840 d) 1103.64 e) 1298.4

12. $4.7 \overline{)0.3666}$ a) 0.0078 b) 0.078 c) 0.78 d) 7.8 e) 78

13. −3+7= a) −4 b) −10 c) −21 d) 4 e) 10

14. −8−5= a) −3 b) −13 c) −40 d) 3 e) 13

15. (−6) × (−9) = a) −3 b) −15 c) −54 d) 3 e) 54

16. $\frac{15}{-5}$ = a) −3 b) −10 c) −75 d) 3 e) 10

17. Change 75% to an equivalent decimal.
a) 0.75 b) 7.5 c) 75 d) 750 e) 7500

18. 60% of 125 is a) 0.75 b) 7.5 c) 75 d) 750 e) 7500

19. $\frac{25}{13}$ may be rewritten as a) $\frac{12}{13}$ b) $1\frac{2}{13}$ c) $1\frac{12}{13}$ d) $2\frac{1}{13}$ e) $25\frac{1}{13}$

20. $5\frac{1}{3} - 2\frac{3}{4}$ = a) $2\frac{5}{12}$ b) $2\frac{7}{12}$ c) $3\frac{5}{12}$ d) $3\frac{7}{12}$ e) $3\frac{13}{12}$

21. $\frac{15}{35}$ may be simplified by writing it as
a) $\frac{5}{3}$ b) $\frac{7}{5}$ c) $\frac{3}{5}$ d) $\frac{3}{7}$ e) $\frac{5}{7}$

TEST NUMBER: G-1 DO NOT WRITE ON THIS TEST !!!!

MATHEMATICS PLACEMENT TEST (PART 2)

INSTRUCTIONS:
1. Fill in name, date, and test number on computer answer sheet.
2. Use scratch paper provided by lab instructor.
3. Turn in test, answer sheet, and scratch paper.

22. The area of the triangle shown is:

a) 150 b) 144 c) 180 d) 72 e) none of these

23. The perimeter of a rectangle 30 feet long and 20 feet wide is:
a) 100 feet b) 50 feet c) 1200 feet d) 600 feet e) none of these

24. If $x = -2$ and $y = 5$, the value of $12-4x+3y-2xy$ is :
a) -1 b) 55 c) 930 d) 0 e) none of these.

25. Simplify: $3(2x-4)-6$
a) $x-12$ b) $6x-18$ c) $x-4$ d) $6x-10$ e) none of these.

26. Solve for x: $4x+7=2x-11$
a) 3 b) 9 c) -9 d) -18 e) none of these

27. $(x+6)(x-4)$ is: a) $x^2+2x-24$ b) $x^2-2x-24$ c) x^2-24 d) $2x-2$
e) $x^2-10x-24$

28. Factor completely: $x^2+3x-10$
a) $(x-4)(x-6)$ b) $(x-5)(x+2)$ c) $(x+5)(x-2)$ d) $(x+3)(x-10)$ e) none of these

29. Simplify: $\frac{x^2+5x-24}{x^2+10x+16}$ a) $\frac{(x-8)(x+3)}{(x-8)(x+2)}$ b) $\frac{x-3}{x+2}$ c) $\frac{-3}{2}$ d) $\frac{-32}{-25}$
e) none of these

30. Simplify: $\frac{x+1}{4x} - \frac{x-2}{3x}$ a) $\frac{-x+11}{12}$ b) $\frac{-x-1}{12x}$ c) $\frac{-x+11}{12x}$ d) $\frac{7x-5}{12x}$
e) none of these

31. Simplify: $\frac{x^2-5x}{x^2+3x+2} \cdot \frac{x^2+7x+10}{x^2-25}$

a) $\frac{2x+10}{3x-23}$ b) $\frac{2x^2+2x+10}{2x^2+3x-23}$ c) $\frac{x}{x+5}$ d) $\frac{x+2}{x+1}$ e) $\frac{x}{x+1}$

32. Divide $(x^2+8x+17)$ by $(x+3)$. (R=remainder)
a) (x+5), R=3 b) (x+11), R=-16 c) (x+5), R=2 d) (x+4), R=5 e) (x-5), R=2

33. Simplify: $4\sqrt{32} - 2\sqrt{8}$ a) $12\sqrt{2}$ b) $20\sqrt{2}$ c) $6\sqrt{8}$ d) $14\sqrt{8}$
e) none of these

34. Solve this equation for x : $\frac{3}{x-2} = \frac{x+1}{x-2} - 3$

a) x={2} b) x={-2} b)$\emptyset$,{} d) x={$-\frac{3}{2}$} e) x={$\frac{3}{2}$}

35. Solve this equation for x: $x^2-10x+21=0$

a) x={-3,-7} b) x={3,-7} c) x={3,7} d) x={-3,7} e) x={-10,-11}

36. Solve the pair of equations for the common solution, (x,y): $3x-2y=11$
$2x+5y=39$

a) ($\frac{1}{3}$, -5) b) ($-\frac{1}{3}$, 5) c) ($\frac{5}{3}$, -2) d) (7,-5) e) (7,5)

APPENDIX III-8
NORTHEAST CAMPUS

MATHEMATICS 1403 PLACEMENT TEST

ARITHMETIC SKILLS
(DESCRIPTIVE TESTS OF MATHEMATICS SKILLS OF THE COLLEGE BOARD)

Time—30 minutes
35 Questions

Directions: Solve each problem in this test using the paper provided by your test administrator if needed. Then indicate the answer by darkening the appropriate space on the answer sheet. Do not write in this test booklet.

1. $\begin{array}{r} 380 \\ \times\ 25 \end{array}$

(A) 9,500
(B) 8,400
(C) 8,080
(D) 2,660

2. $\begin{array}{r} 1,405 \\ -\ 932 \end{array}$

(A) 463
(B) 473
(C) 573
(D) 673

3. Which of the following is equal to 35%?

(A) $\frac{35}{1,000}$

(B) $\frac{35}{100}$

(C) $\frac{35}{10}$

(D) $\frac{35}{1}$

4. $\begin{array}{r} 6,709 \\ +\ 486 \end{array}$

(A) 7,295
(B) 7,195
(C) 6,195
(D) 6,185

5. $9\overline{)405}$

(A) 5
(B) 36
(C) 45
(D) 50

6. $129 + 3,837 + 45 =$

(A) 3,901
(B) 3,991
(C) 4,001
(D) 9,617

7. $1,000 \times 40 =$

(A) 480
(B) 4,000
(C) 40,000
(D) 400,000

8. $\frac{1}{7} + \frac{2}{7} =$

(A) $\frac{3}{49}$ (B) $\frac{2}{14}$ (C) $\frac{1}{14}$ (D) $\frac{3}{7}$

GO ON TO THE NEXT PAGE.

9. $28.9 - 1.45 =$

(A) 14.4
(B) 26.45
(C) 27.45
(D) 27.55

10. 218×407

(A) 10,246
(B) 88,726
(C) 88,733
(D) 89,726

11. $4 \div \frac{3}{8} =$

(A) $\frac{32}{3}$ (B) $\frac{32}{12}$ (C) $\frac{12}{8}$ (D) $\frac{3}{32}$

12. How many 6-ounce servings can be made with three 32-ounce cartons of milk?

(A) 16 (B) 18 (C) 24 (D) 64

13. $\frac{1}{6} + \frac{1}{5} =$

(A) $\frac{1}{30}$ (B) $\frac{1}{11}$ (C) $\frac{2}{11}$ (D) $\frac{11}{30}$

14. $76\overline{)7834}$

(A) 13 with remainder 6
(B) 13 with remainder 16
(C) 103 with remainder 6
(D) 103 with remainder 16

15. $4.7 \times 100 =$

(A) 0.047 (B) 47 (C) 470 (D) 4,700

16. $\frac{8}{12} =$

(A) $\frac{1}{4}$ (B) $\frac{2}{3}$ (C) $\frac{2}{5}$ (D) $\frac{3}{4}$

17. $711 - 48 =$

(A) 673 (B) 663 (C) 331 (D) 231

18. $\frac{4}{15} \times \frac{3}{4} =$

(A) $\frac{1}{3}$ (B) $\frac{1}{4}$ (C) $\frac{1}{5}$ (D) $\frac{1}{6}$

19. $2.7\overline{)81.54}$

(A) 32.0
(B) 30.2
(C) 3.3
(D) 3.02

20. $2\frac{5}{6} =$

(A) $\frac{7}{6}$ (B) $\frac{10}{6}$ (C) $\frac{13}{6}$ (D) $\frac{17}{6}$

GO ON TO THE NEXT PAGE.

21. If 5 pounds of hamburger cost $6.05, how much will 3 pounds cost?

(A) $1.21 (B) $2.42 (C) $3.63 (D) $9.68

22. $1.52 \times 40.3 =$

(A) 6.536 (B) 61.256 (C) 65.36 (D) 612.56

23. $\frac{13}{8} \div \frac{11}{4} =$

(A) $\frac{32}{143}$ (B) $\frac{13}{22}$ (C) $\frac{22}{13}$ (D) $\frac{143}{32}$

24. Fifty gallons of gasoline were used on a 900 mile car trip that required two days. What was the average number of miles per gallon for the trip?

(A) 9 (B) 18 (C) 27 (D) 36

25. $15 \times 2\frac{3}{5} =$

(A) $30\frac{3}{5}$ (B) 33 (C) 36 (D) 39

26. $\frac{25}{8} =$

(A) 0.32 (B) 3.125 (C) 3.2 (D) 31.25

27. $\frac{7}{9} - \frac{2}{3} =$

(A) $\frac{1}{9}$ (B) $\frac{5}{27}$ (C) $\frac{1}{3}$ (D) $\frac{5}{6}$

28. If a swimming pool is 40 meters long, how many complete lengths would a person have to swim in order to have gone at least 1,500 meters?

(A) 12 (B) 14 (C) 36 (D) 38

29. 8% of 30 is

(A) 0.24 (B) 2.4 (C) 24 (D) 240

30. If the price of an item originally costing $4.40 is reduced by 10 per cent, the new price is

(A) $3.96
(B) $4.00
(C) $4.36
(D) $4.84

31. $0.7\overline{)490}$

(A) 0.7
(B) 7.0
(C) 70
(D) 700

GO ON TO THE NEXT PAGE.

32. $\frac{4}{3} \cdot \frac{3}{4} - \frac{1}{2} =$

(A) $\frac{1}{2}$ (B) $\frac{6}{5}$ (C) $\frac{19}{12}$ (D) $\frac{31}{12}$

33. $\frac{98.3}{1,000} =$

(A) 0.0983
(B) 0.983
(C) 98.30
(D) 983.0

34. What per cent of 25 is 28 ?

(A) 5% (B) $12\frac{1}{2}\%$ (C) 75% (D) 80%

35. Wendy purchased a car and made a down payment of $300. If the down payment was $\frac{1}{12}$ of the purchase price, what was the purchase price?

(A) $2,500
(B) $3,300
(C) $3,600
(D) $4,000

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.

ARITHMETIC SKILLS

This test measures your ability to perform basic arithmetic operations and to solve problems that involve fundamental arithmetic concepts. Each question tests one of the following skills:

- Operations with Whole Numbers
- Operations with Fractions
- Operations with Decimals and Percent
- Applications Involving Computation

Sample Question

431 − 175 =

(A) 256 (B) 266 (C) 344 (D) 356

Correct Answer: (A)

As you take the test, answer all questions by marking the letter of your chosen answer on the answer sheet. Scratch work for performing calculations and solving problems must be done on paper provided you by your test administrator. Do not write in this test booklet.

Work as quickly as you can, but do not spend too much time on any one question. If you find a question difficult to answer, go on to the next one. You may have time to return to the difficult question later. You should mark an answer to every question even if you are not sure of the correct answers for some of them. Your score will be the number of correct answers. No credit will be taken away for incorrect answers.

The test is used with a self-scoring answer sheet. When the test is over, you will be told how to score your own answer sheet.

TEST 1
3ADT
430011
380P28X PP. 6 QTY. 38
PRINTED IN U.S.A.

ELEMENTARY ALGEBRA SKILLS
(DESCRIPTIVE TESTS OF MATHEMATICS SKILLS OF THE COLLEGE BOARD)

Time—30 minutes

35 Questions

Directions: Solve each problem in this test using the paper provided by your test administrator if needed. Then indicate the answer by darkening the appropriate space on the answer sheet. Do not write in this test booklet.

1. $4(a + 2) =$

   (A) $4a + 8$ (B) $4a + 6$ (C) $4a + 2$ (D) $a + 8$

2. If $x - 1 = 2$, then $x + 1 =$

   (A) 1 (B) 2 (C) 3 (D) 4

3. If $x = 3$, then $x^2 + 3 =$

   (A) 6 (B) 9 (C) 12 (D) 27

4. $13a - 15b - a + 2b =$

   (A) $13 - 13b$
   (B) $12a - 13b$
   (C) $14a - 17b$
   (D) $12a^2 - 13b^2$

5. If $x = -4$ and $y = -7$, then $x - y =$

   (A) -11 (B) -3 (C) 3 (D) 11

6. $\frac{(-2)(-6)}{-4} =$

   (A) -3 (B) -2 (C) 2 (D) 3

7. $4 - (-2 + 5) =$

   (A) 11 (B) 7 (C) 1 (D) -3

8. $(2xy^3)^3 =$

   (A) $6x^3y^9$
   (B) $6x^6y^6$
   (C) $8x^3y^6$
   (D) $8x^3y^9$

9. If $7y - 4 = 16 + 3y$, then $y =$

   (A) $\frac{6}{5}$ (B) 2 (C) 3 (D) 5

10. $(2x - 1)(4x + 1) =$

    (A) $8x^2 - 2x - 1$
    (B) $8x^2 - 6x - 1$
    (C) $8x^2 - 1$
    (D) $6x$

11. $(10)\left(-\frac{1}{5}\right)(-2)(3) =$

    (A) -12 (B) -3 (C) 10 (D) 12

12. $3p > p + 12$ is equivalent to

    (A) $p > 1$ (B) $p > 3$ (C) $p > 4$ (D) $p > 6$

GO ON TO THE NEXT PAGE.

13. $\frac{x^2}{y} \cdot \frac{x}{y^2} =$

(A) $\frac{x}{y}$ (B) $\frac{y}{x}$ (C) xy (D) $\frac{x^3}{y^3}$

14. $x^2 - 100 =$

(A) $(x + 10)^2$
(B) $(x - 10)^2$
(C) $(x + 10)(x - 10)$
(D) $(x - 50)(x - 50)$

15. $(2x + 3) - (x - 2) =$

(A) $x + 5$ (B) $x + 1$ (C) 3 (D) 7

16. If $\frac{1}{3}$ of a number is 8, then what is $\frac{1}{4}$ of the number?

(A) $\frac{1}{12}$ (B) $\frac{1}{6}$ (C) 6 (D) 12

17. If $x = -2$ and $y = 5$, then $x^3y =$

(A) -40 (B) -30 (C) 30 (D) 40

18. $(x^2 - 3x + 2) - (3x^2 + 5x + 1) =$

(A) $4x^2 - 8x + 1$
(B) $2x^2 - 2x + 3$
(C) $-2x^2 + 2x + 3$
(D) $-2x^2 + 2x + 1$

19. If $ax + b = 3$ and $a \neq 0$, then $x =$

(A) $\frac{b + 3}{a}$ (B) $\frac{3 - b}{a}$ (C) $\frac{b - 3}{a}$ (D) $3 - b$

20. $\frac{2x}{5y} \cdot \frac{9y}{4x^2} =$

(A) $6xy$ (B) $\frac{3y}{2x}$ (C) $\frac{9x^3}{27y^2}$ (D) $\frac{3}{2x}$

21. If $1 - 5x < 3$, then

(A) $x < -\frac{2}{5}$ (B) $x > -\frac{2}{5}$ (C) $x < \frac{2}{5}$ (D) $x > \frac{2}{5}$

22. $2x^2 + 5x - 3 =$

(A) $(2x - 3)(x + 1)$
(B) $(2x + 3)(x - 1)$
(C) $(2x - 1)(x + 3)$
(D) $(2x + 1)(x - 3)$

23. $(-2x^2)(3x^3y)(-y) =$

(A) $-6x^2y$ (B) x^2 (C) $6x^4y$ (D) $6x^4y^2$

24. $|3 - 8| =$

(A) -11 (B) -5 (C) 5 (D) 11

25. $\sqrt[3]{-27} =$

(A) -9 (B) -3 (C) 3 (D) 9

GO ON TO THE NEXT PAGE.

26. $xy^3 + yx^3 =$

(A) $xy(y^2 + x^2)$
(B) $xy(y^3 + x^3)$
(C) $xy^2(y + x)$
(D) $x^2y(x + y)$

27. If the sum of three numbers is 65 and one of the numbers is x, what is the sum of the other two?

(A) $65 + x$
(B) $65 + 2x$
(C) $65 - x$
(D) $65 - 2x$

28. Which of the following is a factor of $x^2 + x - 12$?

(A) $(x - 2)$
(B) $(x - 3)$
(C) $(x - 4)$
(D) $(x - 6)$

29. $x - 3(2 - x) =$

(A) -6 (B) $-2x - 6$ (C) $4x - 6$ (D) $4x + 6$

30. If $5(2x + 3) - (x + 3) = 0$, then $x =$

(A) -2 (B) $-\frac{4}{3}$ (C) $-\frac{2}{3}$ (D) 0

31. $(2m + 3)^2 =$

(A) $4m^2 + 12m + 9$
(B) $4m^2 + 6m + 9$
(C) $2m^2 + 6m + 3$
(D) $4m^2 + 9$

32. The average of x, y, and z is 80. If two of the numbers are 74 and 78, then what is the other number?

(A) 76 (B) 84 (C) 86 (D) 88

33. $4^2 + 4^0 =$

(A) 20 (B) 17 (C) 16 (D) 8

34. $\frac{6m^2 + 2m}{2m} =$

(A) $6m^2$ (B) $6m^2 + 1$ (C) $3m$ (D) $3m + 1$

35. $\sqrt{64x^{16}} =$

(A) $32x^8$ (B) $8x^8$ (C) $16x^4$ (D) $8x^4$

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.

ELEMENTARY ALGEBRA SKILLS

This test measures your ability to perform basic algebraic operations and to solve problems that involve elementary algebraic skills and concepts. Each question tests one of the following skills:

- Operations with Real Numbers
- Operations with Algebraic Expressions
- Solution of Equations, Inequalities, and Word Problems

Sample Question

In the equation $5x - 2y = 30$, if $y = 0$, then $x =$

(A) -15 (B) 6 (C) 10 (D) 25

Correct answer: (B)

As you take the test, answer all questions by marking the letter of your chosen answer on the answer sheet. Scratch work for performing calculations and solving problems must be done on paper provided you by your test administrator. Do not write in this test booklet.

Work as quickly as you can, but do not spend too much time on any one question. If you find a question difficult to answer, go on to the next one. You may have time to return to the difficult question later. You should mark an answer to every question even if you are not sure of the correct answers for some of them. Your score will be the number of correct answers. No credit will be taken away for incorrect answers.

The test is used with a self-scoring answer sheet. When the test is over, you will be told how to score your own answer sheet.

DO NOT OPEN THE TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.

TEST 3
3ADT
43001I
S60P25X PP. 6 QTN. 38
PRINTED IN U.S.A.

INTERMEDIATE ALGEBRA SKILLS
(DESCRIPTIVE TESTS OF MATHEMATICS SKILLS OF THE COLLEGE BOARD)

Time—30 minutes

30 Questions

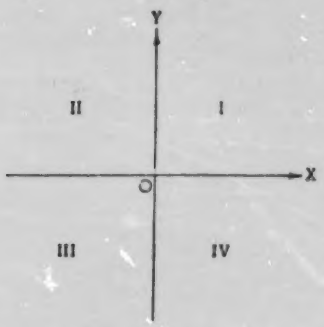
Directions: Solve each problem in this test using the paper provided by your test administrator if needed. Then indicate the answer by darkening the appropriate space on the answer sheet. Do not write in this test booklet.

1. $4x^2 - 49 =$

   (A) $(2x - 7)(2x + 7)$
   (B) $(4x - 49)(x + 1)$
   (C) $4(x - 7)(x + 7)$
   (D) $(4x - 7)(4x + 7)$

2. $(-3x^3)^2 =$

   (A) $-6x^6$ (B) $9x^5$ (C) $9x^6$ (D) $9x^9$



3. Which quadrant contains the points that satisfy both $x < -2$ and $y > 1$?

   (A) I (B) II (C) III (D) IV

4. $7x^2 + 18xy + 8y^2 =$

   (A) $(7x + 2y)(x + 4y)$
   (B) $(7x + 4y)(x + 2y)$
   (C) $(7x^2 + 4)(1 + 2y^2)$
   (D) $(x + y)(7x + 8y)$

5. $\frac{x^2 - 3x + 2}{3x - 3} =$

   (A) $\frac{x^2 + 2}{-3}$
   (B) $\frac{x - 2}{3}$
   (C) $x + 1$
   (D) $\frac{x + 2}{3}$

6. $(a - 3b)^2 =$

   (A) $a^2 - 9b^2$
   (B) $a^2 + 6b^2$
   (C) $a^2 - 3ab + 9b^2$
   (D) $a^2 - 6ab + 9b^2$

GO ON TO THE NEXT PAGE.

$$\begin{cases} x + y = 7 \\ 3x - y = 5 \end{cases}$$

7. In the solution of the system of equations above, what is the value of x?

(A) 6 (B) 4 (C) 3 (D) $\frac{8}{3}$

8. $x^3y - xy^2 =$

(A) $xy(x^3 - y)$
(B) $x^2y^2(x - y)$
(C) $x^3y(1 - y)(1 + y)$
(D) $x^2y(x - y^2)$

9. If $\frac{x - 2}{4} = \frac{2x + 1}{3}$, then $x =$

(A) 2 (B) $\frac{3}{5}$ (C) $-\frac{3}{5}$ (D) -2

10. $(8a^6)^{\frac{1}{3}} =$

(A) $2a^2$ (B) $\frac{8}{3}a^2$ (C) $2a^3$ (D) $\frac{8}{3}a^3$

11. The values of x for which $|x - 3| = 12$ are

(A) 9 only
(B) 15 only
(C) -9 and 15
(D) 9 and 15

12. $\sqrt{27} + \sqrt{12} =$

(A) $\sqrt{39}$
(B) $13\sqrt{3}$
(C) $6\sqrt{3}$
(D) $5\sqrt{3}$

13. If $y = mx + b$ and $m \neq 0$, then $x =$

(A) $\frac{y - b}{m}$ (B) $\frac{b - y}{m}$ (C) $\frac{y}{m} - b$ (D) $b - \frac{y}{m}$

GO ON TO THE NEXT PAGE.

14. Which of the following is the graph of $y = 4x - 1$?

(A)

(B)

(C)

(D)

15. Which of the following is equivalent to $3x + 4 > x - 1$?

(A) $x > -5$ (B) $x > -\frac{5}{2}$ (C) $x > \frac{5}{4}$ (D) $x > \frac{3}{2}$

16. What is the slope of the line that contains the points $(-3, 2)$ and $(0, 0)$?

(A) $-\frac{3}{2}$ (B) $-\frac{2}{3}$ (C) $\frac{2}{3}$ (D) $\frac{3}{2}$

17. What are the roots of $3x(x + 1)(x - 2) = 0$?

(A) -1, 0, and 2

(B) -1, $-\frac{1}{3}$, and 2

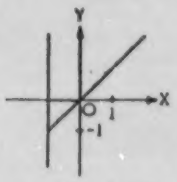
(C) -2, 1, and 0

(D) -1 and 2 only

GO ON TO THE NEXT PAGE.

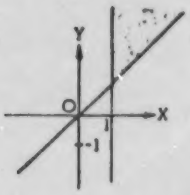
18. Which of the following shaded regions is the graph of the set $\{(x, y) : y \geq x \text{ and } x \geq 1\}$?

(A)

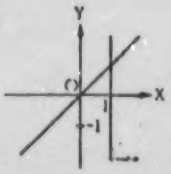


(B)

(C)



(D)



19. $\frac{7x^2 - 14x}{3xy} \div \frac{xy - 2y}{y^2} =$

(A) $\frac{7(x - 2)^2}{3y^2}$

(B) $\frac{7(x - 2)}{3y}$

(C) $\frac{7}{1y}$

(D) $\frac{7}{3}$

20. The roots of the equation $x^2 + 13x - 30 = 0$ are

(A) −15 and 2
(B) −10 and −3
(C) −2 and 15
(D) 3 and 10

21. The distance between the points (2, 3) and (5, 7) is

(A) $\sqrt{149}$ (B) 7 (C) $\sqrt{47}$ (D) 5

22. $\frac{1}{x - 1} - \frac{1}{x + 1}$

(A) 0 (B) $\frac{1}{x}$ (C) $\frac{2}{x^2 - 1}$ (D) $\frac{2x}{x^2 - 1}$

23. The y-intercept of the graph of $2x - 3y = 8$ is

(A) 8 (B) $\frac{2}{3}$ (C) $-\frac{4}{3}$ (D) $-\frac{8}{3}$

24. What are all values of x for which $x^2 - 9x \geq 0$?

(A) $x \geq -9$
(B) $x \geq 9$
(C) $0 \leq x \leq 9$
(D) $x \leq 0$ or $x \geq 9$

25. Which of the following is an equation of the line with slope −2 that contains the point (−2, 1) ?

(A) $y + 1 = -2(x - 2)$
(B) $y - 1 = -2(x + 2)$
(C) $y + 1 = 2(x - 2)$
(D) $y - 1 = 2(x + 2)$

26. If $\frac{1}{x} + \frac{2}{x} = \frac{5}{4}$, then $x =$

(A) $\frac{5}{12}$ (B) 2 (C) $\frac{12}{5}$ (D) 4

GO ON TO THE NEXT PAGE.

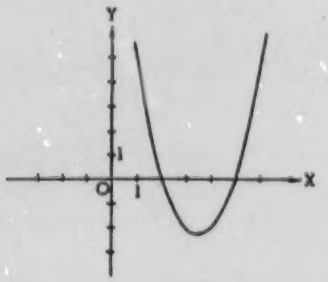
27. An equation of the line that is parallel to $3x + 2y = 7$ and that passes through the point $(0, 0)$ is

(A) $y = -\frac{3}{2}x$

(B) $y = -\frac{2}{3}x$

(C) $y = \frac{2}{3}x$

(D) $y = \frac{3}{2}x$



28. Which of the following could be an equation of the graph above?

(A) $y = x^2 + 7x + 10$

(B) $y = x^2 - 7x + 10$

(C) $y = x^2 - 7x$

(D) $y = -x^2 + 7x - 10$

29. The roots of $2x^2 - 5x - 5 = 0$ are

(A) $\frac{5 \pm \sqrt{15}}{4}$

(B) $\frac{5 \pm \sqrt{65}}{4}$

(C) $\frac{5 \pm \sqrt{35}}{2}$

(D) $\frac{5 \pm \sqrt{65}}{2}$

30. Which of the following is an equation of a line that is perpendicular to a line with a slope of $\frac{2}{5}$?

(A) $y = \frac{2}{5}x + 3$

(B) $y = -\frac{2}{5}x + 3$

(C) $y = \frac{5}{2}x + 3$

(D) $y = -\frac{5}{2}x + 3$

IF YOU FINISH BEFORE TIME IS CALLED CHECK YOUR WORK ON THIS TEST.

INTERMEDIATE ALGEBRA SKILLS

This test measures your ability to solve problems that involve algebraic operations and to solve problems that involve intermediate algebra skills and concepts. Each question tests one of the following skills:

- Algebraic Operations
- Solution of Equations and Inequalities
- Coordinate Plane and Graphs

Sample Question

$(9x^2)^{\frac{1}{2}} =$

(A) $3^2x^{\frac{1}{2}}$ (B) $6x^{\frac{1}{2}}$ (C) $9x^2$ (D) $27x^3$

Correct answer: (D)

As you take the test, answer all questions by marking the letter of your chosen answer on the answer sheet. Scratch work for performing calculations and solving problems must be done on paper provided you by your test administrator. Do not write in this test booklet.

Work as quickly as you can, but do not spend too much time on any one question. If you find a question difficult to answer, go on to the next one. You may have time to return to the difficult question later. You should mark an answer to every question even if you are not sure of the correct answers for some of them. Your score will be the number of correct answers. No credit will be taken away for incorrect answers.

The test is used with a self-scoring answer sheet. When the test is over, you will be told how to score your own answer sheet.

DO NOT OPEN THE TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.

TRIGONOMETRY SKILLS
(DESCRIPTIVE TESTS OF MATHEMATICS SKILLS OF THE COLLEGE BOARD)

Time—30 minutes
30 Questions

Directions: Solve each problem in this test using the paper provided by your test administrator if needed. Then indicate the answer by darkening the appropriate space on the answer sheet. Do not write in this test booklet.

Note: Unless otherwise specified, the domain of a function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

1. If $2^{x-1} = 8$, then $x =$

   (A) 2 (B) 3 (C) 4 (D) 5

2. $\sin 410^\circ =$

   (A) $\sin 10^\circ$
   (B) $\sin 30^\circ$
   (C) $\sin 41^\circ$
   (D) $\sin 50^\circ$

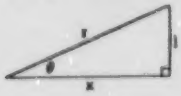
3. Which of the following points (x, y) is NOT on the graph of $y = \frac{1}{x^2 + 1}$?

   (A) $(0, 1)$

   (B) $(1, 2)$

   (C) $\left(2, \frac{1}{5}\right)$

   (D) $\left(3, \frac{1}{10}\right)$



4. In the figure above, $\sin \theta =$

   (A) $\frac{1}{r}$ (B) r (C) $\frac{1}{x}$ (D) $\frac{x}{r}$

5. $\frac{x + 5}{x - 3}$ is not defined for $x =$

   (A) -5 (B) -3 (C) 3 (D) 5

6. If $s(t) = 3t^2 - 2t - 1$, then $s(-1) =$

   (A) -6
   (B) -2
   (C) 0
   (D) 4

7. Which of the following is equivalent to π radians?

   (A) 90° (B) 180° (C) 270° (D) 360°

8. If $f(x) = \frac{x}{x + 1}$ and $g(x) = x^2$, then $g(f(3)) =$

   (A) $\frac{9}{16}$

   (B) $\frac{3}{4}$

   (C) $\frac{9}{10}$

   (D) 9

9. $\tan \frac{\pi}{3} =$

   (A) $\frac{1}{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) 1 (D) $\sqrt{3}$

10. $\sin^2 15^\circ + \cos^2 15^\circ =$

    (A) $\frac{1}{2}$ (B) $\frac{\sqrt{2}}{2}$ (C) $\frac{\sqrt{3}}{2}$ (D) 1

GO ON TO THE NEXT PAGE.

11. Which of the following defines a function whose graph is a straight line?

(A) $f(x) = \frac{1}{x}$

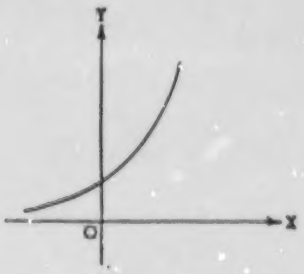
(B) $f(x) = x^2 + 2$

(C) $f(x) = 2x$

(D) $f(x) = |x|$

12. If x is an acute angle and if $\cos x = \frac{4}{5}$, then $\sin x =$

(A) $\frac{1}{5}$ (B) $\frac{1}{4}$ (C) $\frac{3}{5}$ (D) $\frac{3}{4}$



13. An equation for the graph above could be

(A) $y = \left(\frac{1}{2}\right)^x$

(B) $y = 2^x$

(C) $y = \log_2 x$

(D) $y = \frac{1}{\log_x 2}$

14. Which of the following is greatest?

(A) $\cos 0°$
(B) $\cos 30°$
(C) $\cos 60°$
(D) $\cos 90°$

15. For $t > 0$, $\log\left(\frac{t}{t+1}\right) =$

(A) $\log(t+1)$

(B) $\log t - \log(t+1)$

(C) $\log 1$

(D) $\frac{\log t}{\log(t+1)}$

16. If $\sin\theta = \cos\theta$ and $0 \leq \theta \leq \frac{\pi}{2}$, then $\theta =$

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

17. If $x = \log_5 132$, then x is a number such that

(A) $1 < x < 2$
(B) $2 < x < 3$
(C) $3 < x < 4$
(D) $4 < x < 5$

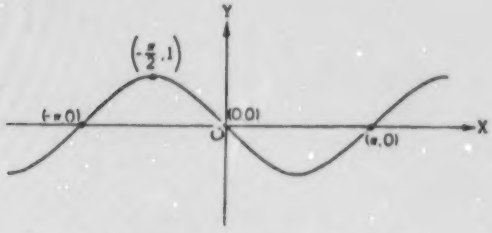
GO ON TO THE NEXT PAGE.

18. If $0 < \theta < \frac{\pi}{2}$, then $\tan \theta \cos \theta =$

(A) $\sec \theta$
(B) $\csc \theta$
(C) $\cot \theta$
(D) $\sin \theta$

19. If $\log_{10}(5x) = 2$, then $x =$

(A) 1 (B) 4 (C) 20 (D) 25



20. The figure above could be the graph of $y =$

(A) $-\cos x$
(B) $-\sin x$
(C) $\cos x$
(D) $\sin x$

GO ON TO THE NEXT PAGE.

21. If $\log_k x = -3$, then $x =$

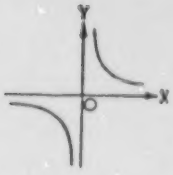
(A) $-3k$ (B) $-\frac{1}{k^3}$ (C) $\frac{1}{3k}$ (D) $\frac{1}{k^3}$

22. Which of the following is NOT the graph of a function $y = f(x)$?

(A)

(B)

(C)



(D)

23. If $y = \left(\frac{1}{3}\right)^x$, which of the following indicates all possible values of y ?

(A) $y > 0$

(B) $y \geq 1$

(C) $0 < y \leq \frac{1}{3}$

(D) $0 < y \leq 1$

24. If $\cos x^\circ = -\frac{1}{2}$ and $90 < x < 180$, then $x =$

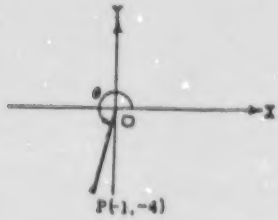
(A) 120 (B) 135 (C) 150 (D) 175

25. For what values of x does $|x - 1|$ equal $x - 1$?

(A) For all values of x
(B) For all $x \geq 1$
(C) For all $x \geq 0$
(D) For all $x \geq 1$

26. If $f(x) = a^x$, then $f(-2) =$

(A) $\frac{1}{4}$ (B) 4 (C) $\frac{1}{a^2}$ (D) a^2



27. In the figure above, $\tan \theta =$

(A) $-\frac{4}{\sqrt{17}}$ (B) $-\frac{1}{\sqrt{17}}$ (C) $\frac{1}{4}$ (D) 4

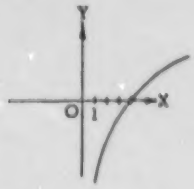
28. Let $f(x) = \sqrt{x - 4}$ for $x \geq 4$. The range of f is the set of all numbers y such that

(A) $y \geq -4$
(B) $y \geq 0$
(C) $y \geq 4$
(D) y is any real number

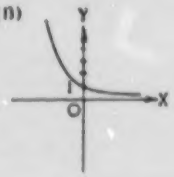
GO ON TO THE NEXT PAGE.

29. Which of the following could represent the graph of $y = \log_4 x$?

(A)

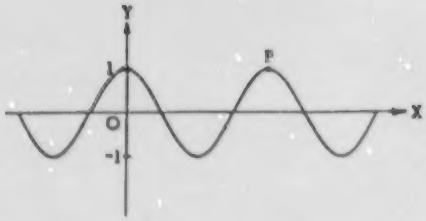


(B)



(C)

(D)



30. The figure above shows a portion of the graph of $y = \cos 2x$. What is the value of x at point P ?

(A) π
(B) 2π
(C) 3π
(D) 4π

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.

TRIGONOMETRY SKILLS

This test measures your ability to solve problems that involve the notion and concepts of a function and to solve problems that involve algebraic, exponential, logarithmic, and trigonometric functions and their graphs. Each question tests one of the following:

- Algebraic Functions
- Exponential and Logarithmic Functions
- Trigonometric Functions

Sample Question

If $f(x) = |1 - x| + |x - 1|$, then $f(3) =$

(A) 6 (B) 4 (C) 2 (D) 0

Correct answer: (B)

As you take the test, answer all questions by marking the letter of your chosen answer on the answer sheet. Scratch work for performing calculations and solving problems must be done on paper provided you by your test administrator. Do not write in this test booklet.

Work as quickly as you can, but do not spend too much time on any one question. If you find a question difficult to answer, go on to the next one. You may have time to return to the difficult question later. You should mark an answer to every question even if you are not sure of the correct answers for some of them. Your score will be the number of correct answers. No credit will be taken away for incorrect answers.

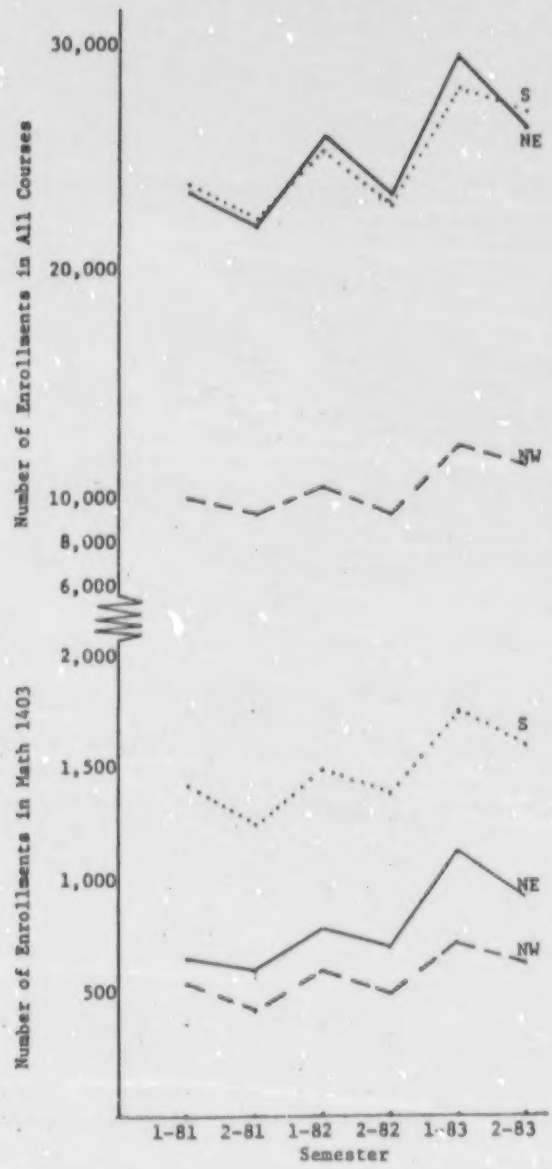
The test is used with a self-scoring answer sheet. When the test is over, you will be told how to score your own answer sheet.

DO NOT OPEN THE TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.

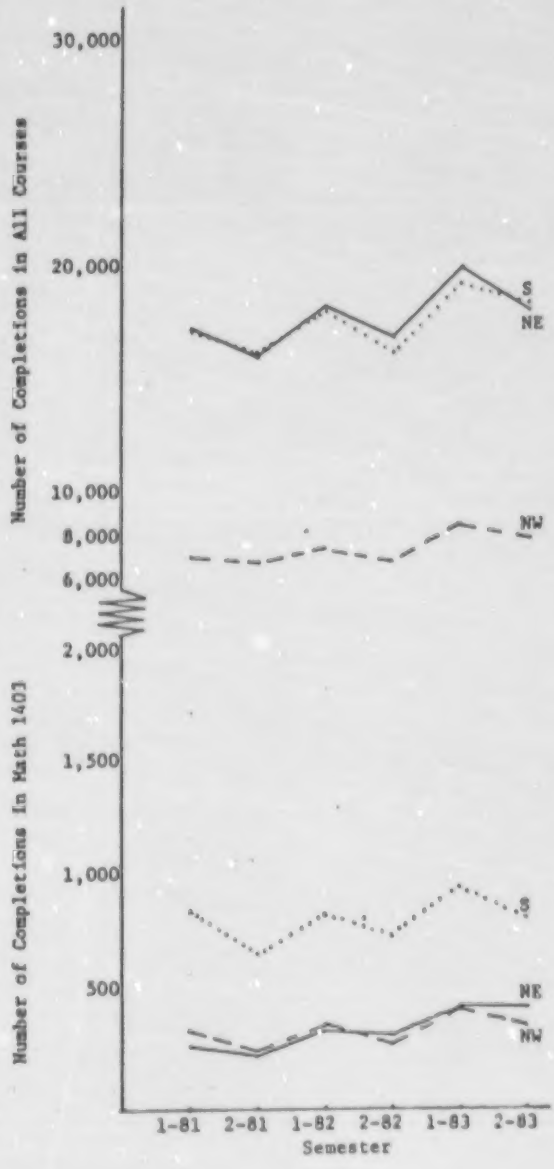
APPENDIX IV-1

ENROLLMENTS AND COMPLETIONS IN MATHEMATICS 1403 AND ALL COURSES

Graph I
Enrollments in
Math 1403 and
All Courses



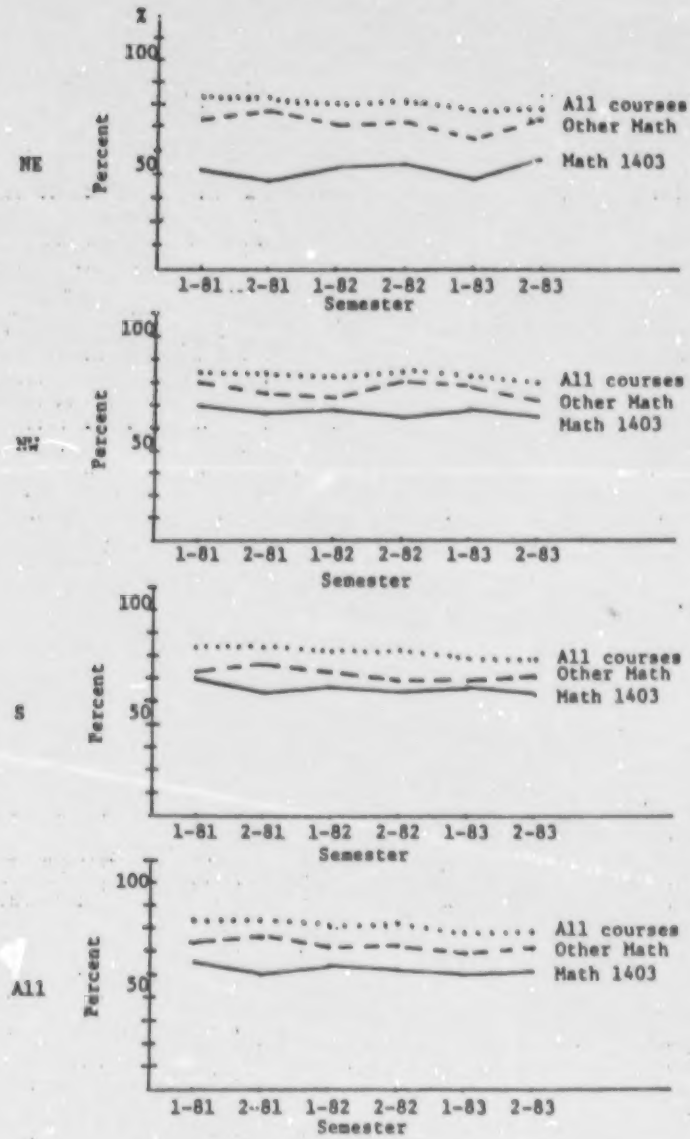
Graph II
Completions in
Math 1403 and
All Courses



APPENDIX IV-2

COMPLETION RATES BY CAMPUS

Graph III
Completion Rates



APPENDIX IV-3

NUMBER AND PERCENTAGE OF ENROLLMENTS IN EACH LEVEL

	SEMESTER	TOTAL *ENR	A		B		C		**NL	
			ENR	%	ENR	%	ENR	%	ENR	%
NE	1-81	688	83	12	319	46	248	36	38	6
	2-81	673	89	13	355	53	194	29	35	7
	1-82	780	101	13	362	47	263	34	54	7
	2-82	728	124	17	327	45	234	32	43	6
	TOTAL	2869	397	14	1363	48	939	33	170	6
NW	1-81	575	192	33	313	54	70	12		
	2-81	455	132	29	220	48	103	23		
	1-82	626	210	34	316	50	97	16	3	0
	2-82	528	135	26	274	52	114	22	5	0
	TOTAL	2184	669	31	1123	51	389	18	8	0
SOUTH	1-81	1452	771	53	493	34	188	13		
	2-81	1292	594	46	490	38	208	16		
	1-82	1563	758	50	538	36	207	14		
	2-82	1407	613	44	520	37	243	17	31	2
	TOTAL	5654	2736	48	2041	36	846	15	31	0
TOTAL ALL CAMPUSES	1-81	2715	1046	39	1125	41	506	19	38	1
	2-91	2420	815	34	1065	44	505	21	35	1
	1-82	2909	1069	37	1216	42	567	19	57	2
	2-82	2663	872	33	1121	42	591	22	79	3
	TOTAL	10707	3802	36	4527	42	2169	20	209	2

* ENR = Enrollment

** NL = No Level Found

APPENDIX IV-4

DISTRIBUTION OF MEANS OF PASSING GRADES (A-D)

A Level

	Semester	#	Mean	Standard Deviation
NE	1-81	44	3.43	.82
	2-81	45	3.42	.84
	1-82	59	3.32	.82
	2-82	73	3.22	.92
NW	1-81	108	2.84	.91
	2-81	70	2.79	1.05
	1-82	124	2.89	.96
	2-82	80	2.86	.86
South	1-81	486	2.87	.89
	2-81	459	2.95	.91
	1-82	370	2.94	.90
	2-82	371	2.92	.93

APPENDIX IV-5

DISTRIBUTION OF MEANS OF PASSING GRADES (A-D)

B Level

	Semester	#	Mean	Standard Deviation
NE	1-81	105	2.92	1.00
	2-81	118	2.72	.97
	1-82	134	2.83	1.02
	2-82	129	2.71	.99
NW	1-81	193	2.84	.96
	2-81	124	2.84	.94
	1-82	187	2.95	.96
	2-82	142	2.79	1.19
SOUTH	1-81	273	2.99	.89
	2-81	270	2.93	.87
	1-82	209	3.04	.90
	2-82	257	2.86	.97

APPENDIX IV-6

DISTRIBUTION OF MEANS OF PASSING GRADES (A-D)

C Level

	Semester	#	Mean	Standard Deviation
NE	1-81	126	3.08	.91
	2-81	84	2.85	.99
	1-82	144	2.78	.96
	2-82	107	2.80	.99
NW	1-81	47	3.09	.87
	2-81	67	3.06	.79
	1-82	54	3.06	.90
	2-82	67	3.01	.76
South	1-81	109	2.92	.80
	2-81	119	2.47	.93
	1-82	115	2.63	.87
	2-82	134	2.71	.91

APPENDIX IV-7

COMPLETION IN SEQUENTIAL COURSES
NORTHEAST CAMPUS

COURSE	SEMESTER			TOTAL	%
	1-81	2-81	1-82		
	*COMP / **ENR	COMP / ENR	COMP / ENR	COMP / ENR	
1403B	5/7	4/6	5/12	14/25	56
1403C	31/45	26/35	40/71	97/151	64
1323	6/7	3/4	4/4	13/15	87
1333	1/1	--	3/9	4/10	40
1633	35/44	17/26	18/45	70/115	61
1603	31/37	12/20	16/28	59/85	69
1613	3/4	3/4	3/4	9/12	75
1623	--	--	1/1	1/1	100
1643	--	--	1/2	1/2	50
1663	1/1	1/1	0/1	2/3	67
1673	--	3/3	4/4	7/7	100
1725	1/2	1/1	1/3	3/6	50
2303	--	--	--	--	--
TOTAL	114/148	70/100	96/184	280/432	65

*COMP = Completed
**ENR = Enrolled

APPENDIX IV-8

COMPLETION IN SEQUENTIAL COURSES
NORTHWEST CAMPUS

COURSE	SEMESTER			TOTAL	%
	1-81	2-81	1-82		
	*COMP / **ENR	COMP / ENR	COMP / ENR	COMP / ENR	
1403B	24/28	9/15	34/36	67/79	85
1403C	49/51	17/19	44/47	110/117	94
1323	10/11	6/8	9/11	25/30	83
1333	3/3	1/2	--	4/5	80
1633	13/24	17/27	16/24	46/75	61
1603	9/15	7/10	7/12	23/37	62
1613	6/6	1/1	6/7	13/14	93
1623	1/1	--	--	1/1	100
1643	1/1	--	1/1	2/2	100
1663	--	--	--	--	--
1673	--	5/5	1/1	6/6	100
1725	0/1	1/1	1/2	2/4	50
2303	--	--	--	--	--
TOTAL	116/141	64/88	119/141	299/370	81

*COMP = Completed
**ENR = Enrolled

APPENDIX IV-9

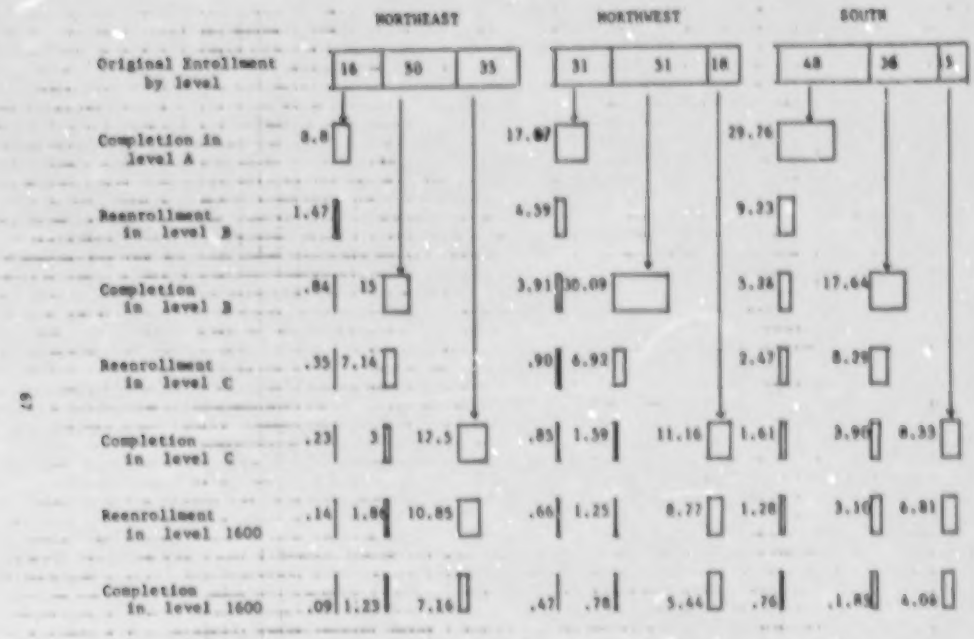
COMPLETION IN SEQUENTIAL COURSES
SOUTH CAMPUS

COURSE	SEMESTER			TOTAL	%
	1-81	2-81	1-82		
	*COMP / **ENR	COMP / ENR	COMP / ENR	COMP / ENR	
1403B	86 / 166	49 / 88	94 / 151	229 / 405	57
1403C	90 / 144	65 / 95	74 / 113	229 / 352	65
1323	35 / 64	20 / 32	18 / 30	73 / 126	58
1333	3 / 4	1 / 1	2 / 4	6 / 9	67
1633	24 / 46	16 / 33	16 / 45	56 / 124	45
1603	15 / 24	24 / 32	17 / 29	56 / 85	66
1613	15 / 15	13 / 16	16 / 21	44 / 52	84
1623	--	--	3 / 3	3 / 3	100
1643	1 / 3	1 / 1	1 / 1	3 / 5	60
1663	--	--	0 / 1	0 / 1	0
1673	4 / 5	0 / 2	3 / 5	7 / 12	58
1725	1 / 1	1 / 4	1 / 1	3 / 6	50
2303	2 / 2	--	--	2 / 2	100
TOTAL	276 / 474	190 / 304	245 / 404	711 / 1182	60

*COMP = Completed
**ENR = Enrolled

APPENDIX IV-10

ENROLLMENTS, REENROLLMENTS, AND COMPLETIONS IN PROGRAM (DYNAMIC MODEL)



APPENDIX IV-11

COMPLETION RATE FOR LECTURE AND PROGRAMMED MODES

DATA FROM FALL 1980 (1-81)

LECTURE

CAMPUS	LEVEL						TOTAL	
	A		B		C			
	*COMP / **ENR	%	COMP / ENR	%	COMP / ENR	%	COMP / ENR	%
NE	-		58 / 135	43	91 / 141	65	149 / 276	54
NW	-		-		-		-	
SOUTH	78 / 107	73	31 / 59	53	12 / 27	44	121 / 193	63

PROGRAMMED

CAMPUS	LEVEL						TOTAL	
	A		B		C			
	COMP / ENR	%	COMP / ENR	%	COMP / ENR	%	COMP / ENR	%
NE	44 / 83	53	47 / 184	26	35 / 107	33	126 / 374	37
NW	108 / 192	56	193 / 313	62	47 / 70	67	348 / 575	61
SOUTH	408 / 664	61	242 / 434	49	97 / 161	60	747 / 1259	59

*COMP = Completed
**ENR = Enrollment

Northwest - taught only in programmed mode

APPENDIX IV-12

COMPLETION RATES BY INDIVIDUAL INSTRUCTOR
NORTHEAST CAMPUS

INSTRUCTOR	ENROLLMENT	# COMPLETED	% COMPLETED
1	244	174	71
2	62	37	60
3	50	16	32
4	57	37	65
5	115	26	23
6	69	30	43
7	251	101	40
8	297	129	43
9	282	111	39
10	329	189	57
11	95	29	31
12	141	51	36
13	387	147	38
14	201	76	38
15	118	46	39
16	103	35	34
17	55	29	53
TOTAL	2856	1263	44

APPENDIX IV-13

COMPLETION RATES BY INDIVIDUAL INSTRUCTOR
NORTHWEST CAMPUS

INSTRUCTOR	ENROLLMENT	# COMPLETED	% COMPLETED
1	232	143	62
2	116	69	59
3	85	54	64
4	186	114	61
5	82	51	62
6	82	42	51
7	154	91	59
8	131	77	59
9	116	74	64
10	110	75	68
11	54	30	56
12	149	93	62
13	115	66	57
14	248	134	54
TOTAL	1860	1113	60

APPENDIX IV-14

COMPLETION RATES BY INDIVIDUAL INSTRUCTOR
SOUTH CAMPUS

INSTRUCTOR	ENROLLMENT	# COMPLETED	% COMPLETED
1	237	129	54
2	70	41	59
3	61	30	49
4	162	78	48
5	526	253	48
6	427	228	53
7	182	102	56
8	491	286	58
9	232	150	65
10	228	144	63
11	86	44	51
12	177	99	56
13	227	133	59
14	301	177	59
15	562	370	66
16	74	42	57
17	177	129	73
18	294	175	60
19	158	75	48
20	67	35	52
21	160	91	57
22	143	88	62
23	94	46	49
24	85	39	46
25	64	30	47
26	131	54	41
TOTAL	5416	3068	57

APPENDIX IV-15

STUDENTS WITHDRAWING WITH AN AVERAGE OF 80 OR HIGHER

Data from fall 1982 (1-83)

By mode of instruction and level

LECTURE

CAMPUS	LEVEL					
	A		B		C	
	*W≥80 / ENR	%	W≥80 / ENR	%	W≥80 / ENR	%
**NE	-		48 / 312	15	14 / 193	7
NW	-		-		-	
SOUTH	33 / 337	10	15 / 225	7	6 / 152	4

PROGRAMMED

CAMPUS	LEVEL					
	A		B		C	
	W≥80 / ENR	%	W≥80 / ENR	%	W≥80 / ENR	%
NE	40 / 257	16	63 / 234	27	22 / 71	31
NW	49 / 234	21	70 / 370	19	19 / 136	14
SOUTH	77 / 568	14	81 / 394	21	8 / 93	9

*W≥80 / ENR — Number of students withdrawn with average ≥80 / Number of students enrolled in level

**NE data incomplete: 1065 enrollment reported
1160 true enrollment

APPENDIX IV-16

STUDENTS WITHDRAWING WITH AN AVERAGE LESS THAN 60

Data from fall 1982 (1-83)

By mode of instruction and level

LECTURE

CAMPUS	LEVEL					
	A		B		C	
	*W<60 / ENR	%	W<60 / ENR	%	W<60 / ENR	%
**NE	-		15 / 312	5	11 / 193	6
NW	-		-		-	
SOUTH	21 / 337	6	24 / 225	11	33 / 152	22

PROGRAMMED

CAMPUS	LEVEL					
	A		B		C	
	W<60 / ENR	%	W<60 / ENR	%	W<60 / ENR	%
NE	2 / 257	1	4 / 234	2	0 / 71	0
NW	2 / 234	1	6 / 370	2	6 / 136	4
SOUTH	23 / 568	4	32 / 394	8	10 / 93	11

*W<60 / ENR — Number of students withdrawn with average <60 / Number of students enrolled in level

**NE data incomplete: 1065 enrollment reported
1160 true enrollment

APPENDIX IV-17

STUDENTS WITHDRAWING AFTER AN INITIAL GRADE OF LESS THAN 70

Data from fall 1982 (1-83)

By mode of instruction and level

LECTURE

CAMPUS	LEVEL					
	A		B		C	
	*W<70/ENR	%	W<70/ENR	%	W<70/ENR	%
**NE	-		84/312	24	33/193	17
NW	-		-		-	
SOUTH	16/337	5	24/225	11	10/152	7

PROGRAMMED

CAMPUS	LEVEL					
	A		B		C	
	W<70/ENR	%	W<70/ENR	%	W<70/ENR	%
NE	25/257	10	56/234	24	8/71	11
NW	17/234	7	24/370	6	4/136	3
SOUTH	40/568	7	35/394	9	8/93	9

*W<70/ENR Number of students withdrawn with initial grade <70 / Number of students enrolled in level

**NE data incomplete: 1063 enrollment reported
1160 true enrollment

APPENDIX IV-18

NORTHEAST CAMPUS

WEEKLY WITHDRAWALS

FALL 1982 (1-83)

WEEK	Programmed Levels A	B	C	Lecture Levels A	B	C	Total #	%
2	0	0	0	-	0	0	0	0
3	0	0	1	-	3	2	6	1
4	6	7	4	-	5	8	30	2.6
5	6	6	4	-	10	18	44	3.8
6	6	12	0	-	7	0	25	2.2
7	9	8	4	-	16	4	41	3.5
8	12	10	3	-	14	5	44	3.8
9	7	10	5	-	18	11	51	4.4
10	4	8	2	-	14	5	33	2.8
11	5	12	2	-	18	5	42	3.6
12	5	8	0	-	11	2	26	2.2
13	10	7	4	-	6	14	41	3.5
14	13	40	11	-	54	35	153	13.2
Totals	83	128	40	-	176	109	536	46

All percentages based on total enrollment of 1160 in Mathematics 1403.

APPENDIX IV-19

NORTHWEST CAMPUS

WEEKLY WITHDRAWALS

FALL 1982 (1-83)

WEEK	Programmed Levels A	B	C	Lecture Levels A	B	C	*NL	Total #	%
2	6	8	2					16	2.1
3	3	12	-				1	16	2.1
4	7	8	2				1	18	2.4
5	7	9	4				1	21	2.8
6	3	7	3					13	1.7
7	9	7	2					18	2.4
8	7	15	1					23	3.1
9	7	9	1					17	2.3
10	3	15	3					21	2.8
11	1	7	3					11	1.5
12	9	9	4					22	2.9
13	12	12	7					31	4
14	3	12	3					18	2.4
Totals	77	130	35				3	245	32.5

All percentages based on total enrollment of 753 in Mathematics 1403.

*No Level Found

APPENDIX IV-20

SOUTH CAMPUS

WEEKLY WITHDRAWALS

FALL 1982 (1-83)

WEEK	Programmed Levels A	B	C	Lecture Levels A	B	C	Total #	%
2	0	0	0	0	0	0	0	0
3	1	0	0	0	2	0	3	0.2
4	9	4	4	5	2	2	26	1.5
5	21	10	5	4	8	3	51	2.9
6	19	13	0	5	14	6	57	3.2
7	7	11	2	10	6	5	41	2.3
8	12	15	3	13	4	3	50	2.8
9	18	12	3	13	5	2	53	3.0
10	14	17	2	6	9	5	53	3.0
11	17	6	0	11	11	3	48	2.7
12	7	15	3	3	5	4	37	2.1
13	5	12	1	6	1	2	27	1.5
14	26	43	8	19	9	11	116	6.5
Totals	156	158	31	95	76	46	562	31.4

All percentages based on total enrollment of 1788 in Mathematics 1403.

APPENDIX IV-21

NORTHEAST CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

PROGRAMMED

TEST	1403-A			TEST CONTENT
	ENR	W	%	
1		11	4	Addition & Subtraction of Real Numbers
2		18	7	Multiplication & Division of Whole Numbers
3		11	4	Multiplying and Dividing Fractions
4		14	5	Adding & Subtracting Fractions
5		12	5	Decimals
6		20	8	Ratio & Proportion / Percent
7		8	3	Measurement
8		0	0	Geometry
9		3	1	Basic Algebra
10				
TOTAL	257	97	38	

APPENDIX IV-22

NORTHWEST CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

PROGRAMMED

TEST	1403-A			TEST CONTENT
	ENR	W	%	
1		13	5.6	Whole Numbers - Decimal System Addition & Subtraction
2		10	4.3	Whole Numbers Multiplication & Division
3		12	5.1	Factors & Divisors Fractions - High & Low Terms
4		13	5.6	Fractions - Addition & Subtractions Mixed Numbers
5		8	3.4	Fractions & Mixed Numbers Multiplication & Division-Decimal Numbers - Place Value-Changing to Fractions-Rounding
6		19	8.1	Percent - Changing to Fractions and Decimal Equations - Applications Ratio & Proportion
7		6	2.6	Measurement - Errors - Significant Digits - Precision - Metrics
8		2	.85	The Integers, Number Line, Absolute Value, Rational Numbers, Reciprocals
9				
10				
TOTAL	234	84	36	

APPENDIX IV-23

SOUTH CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

PROGRAMMED

TEST	1403-A			TEST CONTENT
	ENR	W	%	
1		30	5.3	Whole Numbers - Place Value Addition & Subtraction
2		61	10.7	Multiplication & Division of Whole Numbers, Prime Factorization
3		30	5.3	Addition, Subtraction & Simplification of Fractions
4		21	3.7	Mixed Numbers
5		28	4.9	Operations With Decimal Numbers
6		23	4.0	Percent, Ratio & Proportion
7		0	0	Operations With Rational Numbers
8	F	1	.1	
9				
10				
TOTAL	568	194	34	

APPENDIX IV-24

SOUTH CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

LECTURE

TEST	1403-A			TEST CONTENT
	ENR	W	%	
1		13	3.9	Whole Numbers - Place Value Addition & Subtraction
2		22	6.5	Multiplication & Division of Whole Numbers, Prime Factorization
3		14	4.2	Addition, Subtraction & Simplification of Fractions
4		20	6.0	Mixed Numbers
5		17	5.0	Operations With Decimal Numbers
6		14	4.2	Percent, Ratio & Proportion
7		3	.9	Operations With Rational Numbers
8	F	2	.6	
9				
10				
TOTAL	337	105	31	

APPENDIX IV-25

NORTHEAST CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

PROGRAMMED

TEST	1403-B			TEST CONTENT
	ENR	W	%	
1		21	9	Numbers & Operations
2		3	1	Integers
3		11	5	Linear Equations In One Variable
4		47	20	Operations On Polynomials
5		56	24	Algebraic Fractions
6		22	9	Fractional Equations, Applications
7		5	2	Graphing Points & Lines
8		1	0	Linear Systems, Two Variables
9		0	0	Quadratic Equations
10				
TOTAL	234	166	71	

APPENDIX IV-26

NORTHEAST CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

LECTURE

TEST	1403-B			TEST CONTENT
	ENR	W	%	
1		34	11	Numbers & Operations
2		13	4	Integers
3		33	11	Linear Equations In One Variable
4		41	13	Operations On Polynomials
5		54	17	Algebraic Fractions
6		20	6	Fractional Equations, Applications
7		3	1	Graphing Points & Lines
8		1	0	Linear Systems, Two Variables
9		0	0	Quadratic Equations
10				
TOTAL	312	199	63	

APPENDIX IV-27

NORTHWEST CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

PROGRAMMED

TEST	1403-B			TEST CONTENT
	ENR	W	%	
1		12	3.2	Sets-Arithmetic of Counting Numbers-Highest Common Factor, Lowest Common Multiple-Algebra of Counting Numbers-Expressions-Sentence-Equations-Solving Equations-Truth Sets
2		18	4.9	Arithmetic of Integers-Algebra of Integers Simplification-Exponents
3		25	6.8	Arithmetic of Rational Numbers Algebra of Rational Numbers
4		27	7.3	Graphing Equations: 2 Variables Linear-Common Solutions
5		29	7.8	Introduction to Polynomials - Factoring-FOIL Method - Long Division - Fractions
6		8	2.2	Solving Linear Equations Reciprocals-Fractional & Quadratic Equations
7		2	.54	Rational and Irrational Numbers, Perfect Square Integers, Radical Expressions & Fractions, Quadratic Equations with Irrational Solutions, Perfect Square Trinomials, the Quadratic Formula, Applications
8				
9				
10				
TOTAL	370	121	33	

APPENDIX IV-28

SOUTH CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

PROGRAMMED

TEST	1403-B			TEST CONTENT
	ENR	W	%	
1		13	3.3	Arithmetic, Simplification & Solution to Linear Equations With Natural Numbers
2		27	6.9	Arithmetic With Integers
3		50	12.7	Arithmetic With Rational Numbers, Applications
4		40	10.2	Graphing Linear Equations, Solving Pairs of Equations
5		31	7.9	Operations With Polynomials, Factoring
6		23	5.8	Polynomial Fractions
7		3	.8	Solving Equations (linear, quadratic, fractional)
8		5	1.3	Radicals, Quadratic Formula, Applications
9				
10				
TOTAL	394	192	49	

APPENDIX IV-29

NORTHEAST CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

PROGRAMMED

TEST	1403-C			TEST CONTENT
	ENR	W	%	
1		4	6	Real Numbers & Polynomials
2		12	17	Fractions
3		5	7	Equations & Inequalities
4		9	13	Square Root Radicals, Complex Numbers
5		4	6	Quadratic Equations & Inequalities
6		2	3	Relations, Functions
7		6	8	Linear Systems
8		1	1	Exponents & Radicals
9		1	1	Logarithms
10				
TOTAL	71	44	62	

APPENDIX IV-30

NORTHEAST CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

LECTURE

TEST	1403-C			TEST CONTENT
	ENR	W	%	
1		30	16	Real Numbers & Polynomials
2		16	8	Fractions
3		10	5	Equations & Inequalities
4		12	6	Square Root Radicals, Complex Numbers
5		13	7	Quadratic Equations & Inequalities
6		8	4	Relations, Functions
7		11	6	Linear Systems
8		4	2	Exponents & Radicals
9		3	2	Logarithms
10				
TOTAL	193	107	56	

APPENDIX IV-31

NORTHWEST CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

PROGRAMMED

TEST	1403-C			TEST CONTENT
	ENR	W	%	
1		15	11	Properties of Real Numbers - Arithmetic of Square Roots - Imaginary Numbers
2		7	5.1	Integer Exponents-Rational Number Exponents-Simplifying Radical Expressions
3		1	.73	Polynomials-Addition, Subtraction - Binomials & Trinomials - Long Division
4		2	1.5	Factoring Polynomials-Common Factors Grouping, Difference & Sum Formulas-Substitution, Perfect Squares
5		7	5.1	Polynomial Fractions-Simplifying Monomial Fractions Complex Fractions, Common Denominators
6		6	4.4	Solving Equations & Inequalities-Equivalent Linear Equations, Quadratic Equations-Factoring Quadratic Formula-Solving Cubic Equations-Properties of Inequalities-Absolute Value-Graphing Inequalities
7		3	2.2	Linear & Quadratic Functions, sets, element relations, slope & y-Intercept, Finding Equations in Standard & Other Forms, Evaluating Quadratic Functions, Parabolas, Vertex, Circles, Graphing
8			0	Solving Systems of Equations With Two & Three Unknowns, Common Solutions of Linear and Quadratic Equations, Substitution Method
9			0	Logarithms, Laws and Evaluation
10			0	Applications, Writing Sentences as Equations, Value of Two Variable Digit Problems, Value of Coins Problems, Time, Rate, & Distance
TOTAL	136	41	30	

APPENDIX IV-32

SOUTH CAMPUS

WITHDRAWAL RATES AND CONTENT BEING STUDIED
BY STUDENT AT TIME OF WITHDRAWAL

Fall 1982 (1-83)

PROGRAMMED

TEST	1403-C			TEST CONTENT
	ENR	W	%	
1		15	16.1	Properties of Real Numbers, Arithmetic of Square Roots
2		4	4.3	Integer Exponents, Rational Exponents
3		6	6.5	Operations With Polynomials, Factoring
4		4	4.3	Polynomials Fractions
5		3	3.2	Solving Equations & Inequalities
6		3	3.2	Linear & Quadratic Functions
7		7	7.5	Systems of Equations, Applications (Word Problems)
8				
9				
10				
TOTAL	93	42	45	

APPENDIX V-1

Explanation of Terms and Abbreviations Used

ANX = Score on the Fennema-Sherman Mathematics "Anxiety Scale." Zero, the lowest possible score, indicates high anxiety where mathematics is concerned, and the highest possible score, sixty, indicates low anxiety.

CADMBA = Current admission status (from permanent records)
- HS = High school graduate
- IA = Individual approval
- GED = Admitted on presentation of GED certificate
- CONT = Continuing student
- TRAN = Transfer student
- READM = Readmitted after a period of one semester or more away from TCJC

CON = Score on the Fennema-Sherman "Confidence in Learning Mathematics Scale." A high score indicates that the student is confident about his ability in mathematics. Sixty is the maximum score.

"Highest Completion" (Figures 5-1 through 5-9)
= The largest portion of the students who completed the course responded the specified way.

"Lowest Completion" (Figures 5-1 through 5-9)
= The largest portion of the students who did not complete the course responded the specified way.

N = Number in that portion of the population of 3231 for which we had all the information reported. There are many reasons N is considerably smaller than the enrollment in the courses:

A. Only PT scores made in spring 1983 were used.
B. We do not have complete Pre-Survey or Post-Survey data on all students because of student absence on the date of administration and because at least one instructor did not administer the surveys.
C. Post-Survey data were extremely difficult to obtain from students who did not complete the course. Surveys were mailed to all South Campus students who withdrew from the course with identification information on all the sheets, but the Post-Surveys returned to the Office of Research without any identification on them were not useable because the matching process could not be completed.

PT = Placement Tests:
A. South Campus has used a departmental test of twenty-five questions for more than ten years. The test is divided

A. (continued)
into two parts, requiring about fifty minutes to work. All students take the same test.

1. PT1 has twelve questions. A score of 0-8 on the first 12 questions places a student into 1403A, with 9 or more placing him in 1403B.

2. PT2 has thirteen questions. A score of 0-8 on the second portion places a student into 1403B, with 9 or more on PT2 placing him in 1403C.

B. Northeast Campus: several of the Descriptive Tests of Mathematics Skills of the College Board are given:

1. PT1: Arithmetic Skills: a score of less than 25 (out of a possible 35) means a student is placed into 1403A.

2. PT2: Elementary Algebra Skills: a score of less than 20 (out of a possible 35) means a student is placed into 1403B.

3. PT3: Intermediate Algebra Skills: a score of less than 18 (out of a possible 30) means the student is placed into 1403C.

The proper test for a student is prescribed after a brief interview at testing time.

C. Northwest Campus: a departmental placement test has been used for a number of years. The test has two parts and is administered to all students:

1. PT1: A score on the first 21 questions of less than 15 places the student in 1403A.

2. PT2: A score of 1-7 places a student into 1403B, while 8-11 places him into 1403C.

SPSS = Statistical Package for the Social Sciences, 2nd ed., McGraw-Hill Book Company, New York, the software package administered by the Office of Research to provide the statistics for this report.

Std. Dev. = Standard Deviation for means of ANX and CON.

Std. Error of Est. = Standard Error of Estimate for regression.

APPENDIX V-2

Math 1403 Pre-Survey
Math Department
Spring, 1983

Section No._____Name_____ _____ _____

Social Security Number: __ __ __-__ __-__ __ __ __

Placement Score:_____

Mark the correct answers on your SCANTRON sheet with a #2 pencil.

1. Level placed in:
   A. 1403 A
   B. 1403 B
   C. 1403 C

2. Mark the letter that corresponds to the high school math course(s) you completed. (May be more than one.)
   A. none
   B. 9th grade general math
   C. 10th grade general math
   D. 1 year algebra
   E. 2 years algebra

3. Mark each letter that corresponds to the college math course(s) you have completed:
   A. none
   B. Math 1403 A
   C. Math 1403 B
   D. Technical math 1323 and/or 1333
   E. College algebra

4. How long ago did you last enroll in a math course? (Mark only one.)
   A. less than 6 months
   B. 6-12 months
   C. 1-5 years
   D. 6-15 years
   E. more than 15 years

5. How many hours are you now taking? (Mark only one.)
   A. 3 semester hours
   B. 4-6 semester hours
   C. 7-12 semester hours
   D. 13-15 semester hours
   E. 16 or more semester hours

6. How many hours are you working per week? (Mark only one.)
   A. none
   B. 1-20
   C. 21-40
   D. over 40

7. Mark the letter of the expression that best fits the amount of time you must spend on family responsibilities other than work.
   A. none
   B. very little
   C. moderate amount
   D. great amount

8. Mark the letter that corresponds to the best reason you signed up for this course:
   A. suggested by counselor, teacher or friend after placement test
   B. desire to gain knowledge
   C. help in advancement at work
   D. preparing for a course needed on degree plan
   E. degree or program requires this course

9. How did you do on the math placement test? (Mark one letter.)
   A. better than you expected
   B. about as well as you expected
   C. worse than you expected

10. What grade do you <u>think</u> you will make in this course? (Mark one.)
    A. A
    B. B
    C. C
    D. D
    E. F or W (withdrawal)

11. Why are you enrolled in school? (Mark only one, please.)
    A. parental requirement
    B. personal improvement or came for the fun of it
    C. financial aid benefits (VA, etc.)
    D. employer willing to pay for schooling
    E. unable to find employment

Please turn this sheet over for Attitude Scales.

ATTITUDE SCALES SOCIAL SECURITY NUMBER:

NAME_____ ___-___-____

Here are some statements. There are no correct answers for these statements. They are set up in a way which permits you to indicate the extent to which you agree or disagree with the ideas presented. Mark on your SCANTRON sheet the A if you strongly agree with the statement. Mark the B if you agree with reservations. Mark the C if you cannot answer a statement or if you neither disagree nor agree. Mark the D if you disagree mildly. Mark the E if you strongly disagree.

12. I don't think I could do advanced mathematics.
13. It wouldn't bother me at all to take more math courses.
14. Mathematics makes me feel uneasy and confused.
15. I usually have been at ease during math tests.
16. Generally I have felt secure about attempting mathematics.
17. A math test would scare me.
18. I think I could handle more difficult mathematics.
19. I have a lot of self-confidence when it comes to math.
20. Most subjects I can handle O.K., but I have a knack for flubbing up math.
21. I'm not the type to do well in math.
22. Math has been my worst subject.
23. I'm no good in math.
24. My mind goes blank and I am unable to think clearly when working mathematics.
25. Mathematics makes me feel uncomfortable, restless, irritable, and impatient.
26. I usually have been at ease in math classes.
27. I haven't usually worried about being able to solve math problems.
28. Math doesn't scare me at all.
29. I am sure I could do advanced work in mathematics.
30. Mathematics usually makes me feel uncomfortable and nervous.
31. I can get good grades in mathematics.
32. For some reason even though I study, math seems unusually hard for me.
33. I get a sinking feeling when I think of trying hard math problems.
34. I almost never have gotten shook up during a math test.
35. I am sure that I can learn mathematics.

Courtesy Fennema-Sherman Mathematics Attitudes Scales

APPENDIX V-3

Math 1403 Post-Survey Section Number_____SS#__ __ __-__ __-__ __ __ __
Math Dept.
Spring, 1983 Name_____ CODE_____

Please choose only one (1) answer for each question.

1. Please check the level of Math 1403 you finished or withdrew from:
   1[ ] A
   2[ ] B
   3[ ] C

2. Do you believe that the Mathematics Placement Test placed you in the proper level (or course)?
   1[ ] yes
   2[ ] no, needed lower level
   3[ ] no, needed higher level

3. Select ONE statement that best suits your feelings about the instructional methods used in your section:
   1[ ] I liked the way the instructor conducted the course.
   2[ ] I did not like the way the instructor conducted the course.
   3[ ] I have no opinion.

4. Select ONE statement that best describes how you feel about math after this course:
   1[ ] I feel better about math now.
   2[ ] I feel worse about math now.
   3[ ] I feel about the same, for this course did not change my feelings about math.

5. After having enrolled in this math course, are you more positive or less positive about TCJC?
   1[ ] much more positive
   2[ ] a little more positive
   3[ ] no change in my attitude
   4[ ] a little less positive
   5[ ] much less positive

6. How many hours did you complete this semester?
   1[ ] 0
   2[ ] 1-6
   3[ ] 7-12
   4[ ] 13-15
   5[ ] 16 or more

7. Did you achieve what you wanted to do in your math course?
   1[ ] yes
   2[ ] no

8. Did you make the grade you thought you would make?
   1[ ] yes
   2[ ] no, I made higher
   3[ ] no, I made lower
   4[ ] no, I had to drop the course. (Please answer number 9 if you checked this reply.)

9. If you dropped the course, or were dropped by the instructor, please indicate the primary (one) reason:
   1[ ] fell behind in the work
   2[ ] began to fail tests
   3[ ] unable to attend classes because of illness or personal problems
   4[ ] work hours were changed
   5[ ] family responsibilities increased
   6[ ] lost interest
   7[ ] moved out of district, unable to get back for class
   8[ ] received from course all I wanted to receive
   9[ ] transportation problems

FOR COMPILER'S USE ONLY:	
10.	1[ ] 2[ ] 3[ ] 4[ ] 5[ ] 6[ ] 7[ ] 8[ ]

PLEASE FEEL FREE TO MAKE ANY COMMENTS OR SUGGESTIONS ON THE REVERSE SIDE OF THIS PAGE.

PLEASE RETURN THIS SHEET IN THE ENCLOSED SELF-ADDRESSED ENVELOPE OR RETURN TO YOUR INSTRUCTOR.

APPENDIX V-4

CORRELATION: ANXIETY TO CONFIDENCE

	SOUTH			NORTHEAST			NORTHWEST		
	n	r	sig.	n	r	sig.	n	r	sig.
A LEVEL	545	0.780	0.000	139	0.798	0.000	132	0.725	0.000
Men	278	0.758	0.000	88	0.770	0.000	67	0.709	0.000
Women	267	0.797	0.000	51	0.832	0.000	64	0.787	0.000
B LEVEL	472	0.397	0.000	242	0.791	0.000	344	0.782	0.000
Men	246	0.822	0.000	143	0.279	0.000	190	0.789	0.000
Women	226	0.341	0.000	99	0.994	0.000	154	0.768	0.000
C LEVEL	210	0.815	0.000	104	0.768	0.000	201	0.810	0.000
Men	124	0.833	0.000	54	0.829	0.000	117	0.804	0.000
Women	86	0.701	0.000	50	0.684	0.000	84	0.791	0.000

APPENDIX V-5

MEANS AND STANDARD DEVIATIONS, ANXIETY AND CONFIDENCE SCORES

DATA FOR FENNEMA-SHERMAN GROUPS FOR COMPARISON

MATHEMATICS ANXIETY SCALE:	Female	Male
Mean:	37.32	40.20
Standard Deviation:	14.88	14.04
Number:	187	183

CONFIDENCE IN LEARNING MATH:	Female	Male
Mean:	48.21	47.47
Standard Deviation:	6.43	7.30
Number:	34	70

DATA FOR TARRANT COUNTY JUNIOR COLLEGE MATHEMATICS 1403 GROUPS

	SOUTH		NORTHEAST		NORTHWEST	
	Female	Male	Female	Male	Female	Male
A LEVEL						
MATHEMATICS ANXIETY SCALE						
Mean:	37.12	40.06	35.44	38.46	38.82	41.15
Standard Deviation:	10.94	9.88	12.06	8.47	11.33	9.65
Number:	267	278	64	68	51	88
CONFIDENCE IN LEARNING MATH SCALE						
Mean:	39.55	42.01	38.17	41.02	40.59	41.83
Standard Deviation:	10.87	9.78	10.32	8.46	10.34	10.00
Number:	267	278	64	68	51	88
B LEVEL						
MATHEMATICS ANXIETY SCALE						
Mean:	39.75	41.93	37.57	40.76	39.86	42.98
Standard Deviation:	11.02	10.44	11.69	10.10	11.58	9.26
Number:	225	246	154	190	98	143
CONFIDENCE IN LEARNING MATH SCALE						
Mean:	41.78	45.08	40.53	42.66	41.31	45.56
Standard Deviation:	10.35	9.83	9.96	9.52	11.51	8.27
Number:	225	246	154	190	98	143
C LEVEL						
MATHEMATICS ANXIETY SCALE						
Mean:	41.48	42.32	38.86	44.10	40.36	43.20
Standard Deviation:	11.25	11.08	10.87	9.94	10.26	12.20
Number:	86	124	84	117	50	54
CONFIDENCE IN LEARNING MATH SCALE						
Mean:	45.01	46.13	42.01	46.39	43.64	46.37
Standard Deviation:	10.52	10.15	10.21	8.93	9.53	10.44
Number:	86	124	84	117	50	54

APPENDIX V-6

PEARSON'S CORRELATION COEFFICIENTS:
GRADE (COMPLETION/NONCOMPLETION) WITH ANXIETY AND CONFIDENCE SCORES

All significant at 0.05 level unless they are crossed off.

		SOUTH		NORTHEAST		NORTHWEST	
LEVEL	ITEM	ANX.	CONF.	ANX.	CONF.	ANX.	CONF.
A	r	0.1403	0.1657	0.0834	0.1474	0.1819	0.1970
	n	545	545	133	132	139	139
	sig.	0.001	0.000	0.170	0.046	0.016	0.010
B	r	0.1309	0.1800	0.2134	0.2591	0.1094	0.0730
	n	472	472	344	344	242	242
	sig.	0.002	0.000	0.000	0.000	0.045	0.129
C	r	0.2503	0.2062	0.2103	0.1639	0.2096	0.1863
	n	210	210	201	201	104	104
	sig.	0.000	0.001	0.001	0.010	0.016	0.029

APPENDIX V-7

MEANS AND STANDARD DEVIATIONS FOR ANXIETY AND CONFIDENCE SCORES FOR ALL STUDENTS

		SOUTH		NORTHEAST		NORTHWEST	
LEVEL	ITEM	ANX.	CONF.	ANX.	CONF.	ANX.	CONF.
A	mean	38.62	40.81	36.90	39.74	40.30	41.32
	n	545		133		139	
	std.dev.	10.50	10.39	10.46	9.53	10.32	10.11
B	mean	40.89	43.50	39.33	41.71	41.71	43.82
	n	472		344		241	
	std.dev.	10.77	10.21	10.94	9.76	10.36	9.93
C	mean	41.97	45.67	41.91	44.56	41.84	45.06
	n	210		201		104	
	std.dev.	11.13	10.29	10.63	9.70	11.34	10.06

ERIC® CLEARINGHOUSE FOR JUNIOR COLLEGES
UNIVERSITY OF CALIFORNIA

OCT 27 1984

8118 Math-Sciences Building
Los Angeles, California 90024